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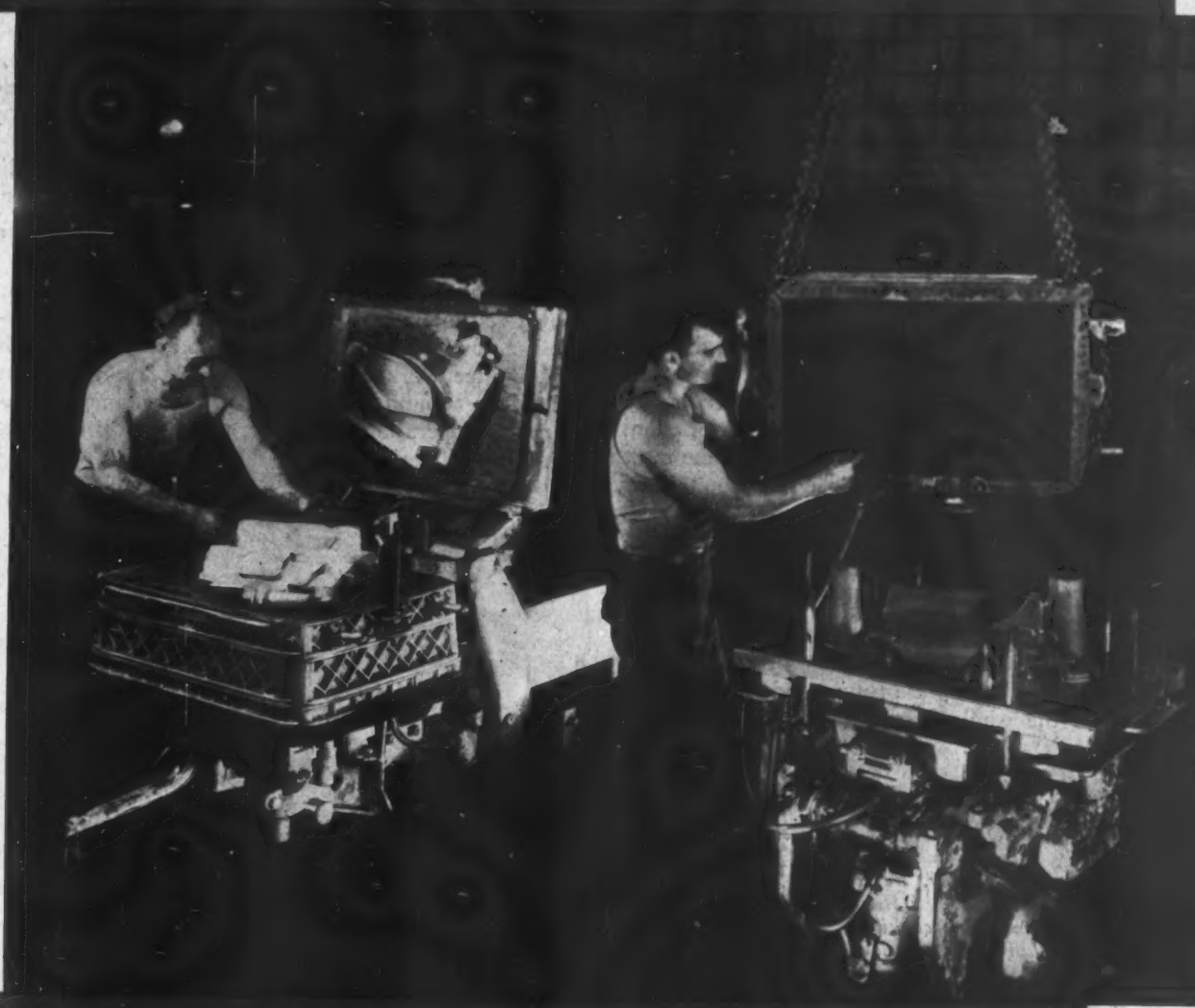
A PUBLICATION PRESENTING ASSOCIATION AND CHAPTER ACTIVITIES



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March
1945

Gray Iron Division Invites Men of Industry To Serve on Committees

AN AMOUNT of research work, unbelievable to those not intimately familiar with its history, has gone into, and is currently going into, the effort to improve gray cast iron, facilitate its production, and consolidate its position as an engineering material.

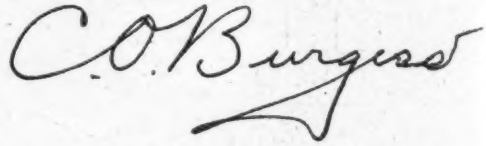
Foundrymen, engineers, and metallurgists of every type have contributed freely to this program, and the industry as a whole owes them a debt of gratitude. The American Foundrymen's Association, and more particularly the Gray Iron Division, has performed and it is hoped in the future will continue to perform an invaluable function in correlating and publicizing the results of such investigations.

Of equal importance, A.F.A. has available, through the various committees established in the framework of the Gray Iron Division, a means by which workers in the field can get together, exchange information, and direct their joint efforts towards solving the most pressing problems. A partial listing of committees now engaged in cooperative research on Shop Operation, Analysis of Casting Defects, Chill Tests, Inoculation, Cupola Research, Welding and High Temperature Properties of Cast Iron, is sufficient to indicate the value and scope of this work.

It must be evident that the future of the gray iron industry, and indirectly the future and the economic position of the whole founding industry, depends to a large extent on the activities of such men. The present message is designed primarily as *a direct invitation and appeal for more and younger men to actively enter into this indispensable work.*

The presence of younger men on our committees is particularly necessary not only for the fresh ideas that they inevitably inject, but because such men actively engaged in production serve to direct attention to problems and difficulties associated with actual operation. We must also depend on such men to guide and extend the work of the committees in the future.

It is becoming increasingly apparent that, in their own self-interest, operating foundries, foundry suppliers, and technical schools should cooperate in committee work and have adequate representation on these committees which will so profoundly influence the operating conditions, the technical advance, and the expansion of the industry.



C. O. BURGESS, *Chairman*
A.F.A. Gray Iron Division

C. O. BURGESS, Research Metallurgist, Union Carbide and Carbon Research Laboratories, Niagara Falls, N. Y., is Chairman of the A.F.A. Gray Iron Division. An active A.F.A. supporter, Mr. Burgess has served on several committees, and he contributed much to the "Cast Metals Handbook" and the "Alloy Cast Irons" book. He has written articles on plain and alloy cast irons, high vanadium tool steel, constitution of Fe-Cr-Mn alloys, and related subjects for various technical societies, including A.F.A., A.S.M., A.I.M.E., and A.S.T.M.

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American Foundryman

MARCH 1945

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NUMBER 3

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1945 EMERGENCY PROGRAM
Approved by Board of Directors
TO CARRY OUT A.F.A. OBJECTIVES

THE emergency program of Association activities for 1945 as unanimously approved at the mid-year Board of Directors' meeting January 17, and announced briefly in the February issue of AMERICAN FOUNDRYMAN, may well represent one of the most important actions by an A.F.A. Board in many years. Faced with an unprecedented wartime requirement, the Directors acted promptly and decisively, voluntarily cancelled a major Association activity, and adopted an alternate plan to make possible continued, perhaps even increased, service to the industry.

The quick rush of events leading up to their decisions, and the sound reasoning that evolved the new program in final form, should be understood by every A.F.A. member. To "change horses in the middle of a stream" is not an easy task. To do so without apparent impairment of a broad and long established national service is even more difficult. And to accomplish this without any resultant criticism whatsoever is, perhaps, impossible.

Making the Decision

When the Board convened on January 17, the Government's appeal had already been issued for restriction of wartime meetings so as to relieve overburdened transportation facilities. A committee had already been set up in Washington to pass upon applications for holding meetings deemed important to the war effort. At the same time, the program for the 4th War Production Foundry Congress was far advanced.

In view of the urgency of the Government's appeal, it immediately became the duty of A.F.A. to carefully consider plans for the Detroit convention. The fact could not be avoided that a successful meeting, even in curtailed form as was suggested, undoubtedly would make large use of rail and hotel facilities.

It was recognized by the Board that A.F.A., as a leader in the foundry industry, was obligated to pursue such a course as could not be questioned, in motive or in judgment, by the membership, the industry, the Government or the general public. It was felt that any action taken should be based on the degree to which it might contribute to our war effort.

In fact, the Directors took the position that if the proper course were to result in a departure from the usual program of A.F.A. activities, then the Association, like thousands of firms all over the country, should not hesitate to adapt itself so as to meet present wartime conditions in a manner consistent with Association policies and essential service.

Emergency Program Adopted

After considerable discussion, the Board voted unanimously the adoption of an emergency program that would enable A.F.A. to comply fully with both the spirit and the intent of the Government's appeal, without serious curtailment of A.F.A. service to the industry. The program adopted consists of six major points as follows:

Point No. 1 authorized voluntary cancellation of the 1945 Foundry Congress scheduled for Detroit in compliance with the Government's appeal.

Postponement of the meeting until Fall was considered inadvisable, since this would withhold distribution of data valuable to the membership. Accordingly, announcement of cancellation was sent promptly to Director of War Mobilization James F. Byrnes, to the trade press and to the Officers of A.F.A. Chapters. Notice of Board action also was sent to the Chairman of the Detroit Chapter, R. G. McElwee, Vanadium Corp. of America, who had invited the A.F.A. to meet there in 1945.

Cancellation of the Detroit meeting breaks a remarkable chain of events in A.F.A. history, for these meetings have been held consecutively for 49 years, with the one exception of 1921. Many members undoubtedly will be disappointed, having planned on attending the Motor City sessions, but it is believed that this voluntary action of the A.F.A. Board will be approved by the general membership.

Plan "Year-'Round" Congress

Point No. 2 in the emergency program provides for staging what has been termed a "Year-'Round Foundry Congress" in lieu of the Detroit meeting, so that a continuous flow of technical and practical papers, reports and discussions can be provided.

Provision is being made to "bring the convention to the Chapters" by having authors present papers in person before local group meetings. This should result in considerably increased Chapter meeting attendance, and it is expected that program committees will make full use of this opportunity.

It has also been suggested that the Chapters might desire to stage all-day or all-afternoon sessions for their local groups, somewhat in the

Sec. Kennedy Urges Support of Program

"Your Officers and Directors desire at this time to express sincere appreciation to the entire membership for the cooperation given A.F.A. activities in the past.

"So long as present wartime conditions last, your continued support of the emergency program adopted is earnestly needed for complete success in your behalf. With a membership of over 7,300 progressive men of the foundry industry back of us, we pledge every possible effort toward providing those essential services vital to the industry's war effort and continued foundry progress."

R. E. KENNEDY,
Secretary.

form of "little conventions," in full compliance with travel restrictions. Another worthwhile suggestion is that Chapters might offer shop operation courses for local plant men. Such courses have proved very popular at recent annual meetings and may be expected to prove equally popular when featured as local events.

Revise Publication Plans

Point No. 3 of the program approved involves temporary suspension of the Quarterly "Transactions," but provides for publication of convention-prepared papers and discussions in regular issues of the AMERICAN FOUNDRYMAN, *beginning in May.*

Presentation of this valuable material month by month provides a much more timely and more satisfactory means of distribution. It should be pointed out that no change is contemplated in publication of the annual bound volume of *Transactions.*

Point No. 4 calls for omission of preprints this year, since the main purpose of preprints has always been to induce discussion at the time of the convention.

With the Detroit meeting cancelled, it is intended that written discussions shall be obtained for publication along with the papers and reports in AMERICAN FOUNDRYMAN.

No Pre-Convention Issue

Point No. 5 of the 1945 program calls for cancellation of the Pre-Convention (April) issue of AMERICAN FOUNDRYMAN.

It was believed that publication of a special Pre-Convention issue without a convention was pointless and could not be justified from an advertiser's point of view. The special issues of April 1943 and April 1944 have been the only A.F.A. publications in which advertising has been accepted up until now, and have been well received by the membership for the added interest gained from information on equipment and supplies.

New Advertising Policy

Point 6. In order to finance the alternate program, and at the same time give the membership of A.F.A. a well-rounded and more complete service, authorization was given for acceptance of commercial advertising in the eight regular issues of AMERICAN FOUNDRYMAN *to be published this year containing "Transactions" material.*

This authority at present applies only to the issues May to December, inclusive. Continuation of any phase of the emergency program is subject to later Board action as may be determined by wartime conditions and membership approval.

The 1945 Emergency Program in Brief

THE following emergency program of A.F.A. activities for 1945 was adopted January 17 by unanimous action of the Board of Directors, after its unanimous approval by the Executive Committee of the Board, in session January 16:

1. Voluntary cancellation of the 1945 Foundry Congress, scheduled for Detroit, April 30-May 4, in compliance with the Government's appeal for restriction of wartime travel.
2. Staging of a "Year-'Round Foundry Congress" in lieu of cancellation of the Detroit meeting, so as to provide a continuous flow of technical and practical data to the industry in accordance with the Association's obligations.
3. Suspension of the Quarterly "Transactions" this year, with the provision that papers and discussions ordinarily printed in the Quarterly be published in AMERICAN FOUNDRYMAN monthly, beginning in May 1945. No change is contemplated in issuance of the annual Bound Volume.
4. Suspension of Preprints this year, due to cancellation of the convention, since the main purpose of Preprints is to induce discussion at the time of the convention. Insofar as possible, written discussion of papers will be sought for publication in AMERICAN FOUNDRYMAN along with the papers discussed.
5. Cancellation of the 1945 Pre-Convention (April) Issue of AMERICAN FOUNDRYMAN, because of cancellation of the 1945 convention; and, instead, acceptance of advertising on a limited scale in the eight regular issues of AMERICAN FOUNDRYMAN, May to December 1945, inclusive.

Equipment and supply firms which had previously reserved advertising space in the cancelled Pre-Convention issue have now been given first opportunity to express their intention of being represented in the regular issues of AMERICAN FOUNDRYMAN available for advertising. It has been made plain to all that Pre-Convention commitments are considered in no way binding.

Because of existing paper restrictions, to which A.F.A. is subject the same as all magazine publishers, only a limited number of pages can be made available in any one issue of AMERICAN FOUNDRYMAN. Once all advertising space available in 1945 is under contract, no more advertising can be accepted this year. In any event, *editorial material must come first* and probably will occupy at least 50 per cent of each issue of your monthly magazine.

Members Voice Approval

For many years, members have urged the acceptance of advertising in AMERICAN FOUNDRYMAN, in the belief that information on equipment and materials would be a natural corollary to articles concerned with their usefulness. Each year, A.F.A. receives unsolicited requests for advertising space in issues other than the Pre-Convention number. The 1945 emergency program makes it possible to honor such requests this year for the first time.

Typical of many comments from members since the special program was announced is the following:

"I am very much impressed with the program A.F.A. has developed for the coming year . . . through the AMERICAN FOUNDRYMAN *and by contact with the chapters it will be possible to reach a great many members, to present interesting and informative data and to help the various chapters in preparing a better program . . .*

"It seems to me that this program should develop a close bond between the chapters and the home office and that it will be more far reaching in its effect than it may appear to be at this time."

A Program of Service

The 1945 emergency program of activities will not in any way affect the Association's basic aims and functions, established nearly a half century ago, "to promote the arts and sciences applicable to metal casting manufacture and to improve the methods of production and the quality of castings. . . ." It was approved solely in order to carry

out these purposes without loss of service to the membership under existing wartime conditions.

AMERICAN FOUNDRYMAN will continue to be the "voice" of A.F.A. in advancing its aims as a non-profit technical society representing all phases of metal casting. Your magazine will continue to represent impartially, as in the past and as at the annual meetings, all elements of the foundry industry as may properly come under the functions of the Association.

At the January 17 Board meeting, tribute was paid the service rendered by *The Foundry*, of Cleveland, as a long-established and well-recognized trade paper of the foundry industry. For many years, *The Foundry* has cooperated closely in the work of A.F.A., and their continued cooperation has been assured in bringing more needed information to the men who make castings.

The greater service that can be rendered the industry in 1945, through the combined efforts of a stronger technical society and a strong trade paper, is expected to prove of real and lasting benefit in advancing castings techniques and general foundry progress.

Member Support Vital

In a recent letter to the entire A.F.A. membership, it was pointed out that this program for 1945 is an ambitious one, and that its success must depend largely on member support and acceptance. Authors of papers promised for the cancelled Detroit meeting have agreed to complete and forward manuscripts as early as possible, and committee chairmen have agreed to continue their activities, especially the preparation of valuable reports.

It is realized that there may be some who will not approve certain elements of this program, even though it was adopted in order to maintain essential services of A.F.A., with that same spirit that has characterized the entire Foundry Industry in adjusting itself to meet tremendous wartime demands. As approved by your National Officers and Directors, it is a sound, progressive and realistic program, which should increase, rather than impair, A.F.A. service to its membership and to the industry.

1945 Annual Meeting To Be Held in July

Ordinarily, the final election of Officers and Directors takes place at the annual meeting of the Association. Due to cancellation of the scheduled Detroit meeting this year, the 1945 annual meeting will be held instead on a representative basis in July at the time of the annual meeting of the Board of Directors. Newly elected Officers and Directors will be announced and presented at that time.

Gray Iron Div. Committee To Prepare Symposium

THE Gray Iron Division Committee on Inoculation held a meeting on Thursday, January 25, Hotel Statler, Cleveland, Ohio, for the purpose of rearranging its plans for participation in the cancelled A.F.A. convention.

In view of the cancellation, the committee has decided to prepare a symposium on inoculation, which will be presented in the monthly magazine, AMERICAN FOUNDRYMAN, in accordance with the plans of the Association to disseminate information which would have been presented at the convention to its members at the earliest possible moment.

The symposium will cover the theories involved, the effect of composition in higher carbon irons, the effect of composition in low carbon irons, effect of melting practice, and practical do's and don't's of inoculation. There are possibilities that one or two other phases of gray iron inoculation will be covered.

The Gray Iron Division Committee on Inoculation is under the chairmanship of T. E. Barlow, Battelle Memorial Institute, Columbus, Ohio.

Philadelphia Featuring 12-Week Lecture Series

THE Philadelphia Chapter announces an elementary foundry course of 12 weeks' duration, meeting weekly at 7:15 P. M. on Wednesdays, commencing February 7, 1945, under sponsorship of the Engineering, Science and Management War Training Program of U. S. Government. The lectures will be given in the Engineering Building University of Pennsylvania, 33rd and Locust Streets, Philadelphia.

Lecturers, all of whom are active in A.F.A. affairs, include: J. A. Sweeney, Florence Pipe Fdry. & Mach. Co., Florence, N. J.; C. L. Lane, Florence Pipe Fdry. & Mach. Co.; Howard Taylor, Naval Research Laboratories, Anacostia Station, Washington, D. C.; George H. Bradshaw, Philadelphia Navy Yard, Philadelphia; E. C. Troy, Dodge Steel Co., Philadelphia; B. A. Miller, Cramp Brass & Iron Fdrs. Div., Baldwin Locomotive Works, Eddystone, Pa.; Charles E. Schley, Philadelphia Bronze & Brass Corp., Philadelphia, and B. H. Bartells, Mechanical Engineering Dept., University of Pennsylvania.

A complete list of the topics to be presented appears in the box below.

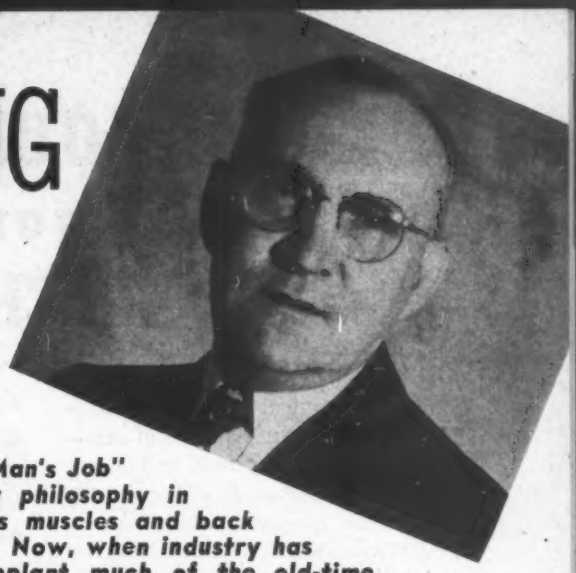
Philadelphia Lecture Course

Wednesday Evenings, 7:15, Starting February 7, 1945

1. "What Is a Foundry?"
2. "Foundry Raw Materials"
3. "Molding Pratice"
4. "Cores"
5. "Melting and Pouring of Steel"
6. "Melting and Pouring of Cast Iron"
7. "Melting and Pouring of Non-Ferrous Metals"
8. "Quiz Night"
9. "Metal Mixtures for Gray and Malleable Iron and Steel"
10. "Metal Mixtures for Brass and Bronze"
11. "Cleaning and Inspection of Castings"
12. "General Summary"

APPRENTICE TRAINING

Proves "Green Light" IN WAR PRODUCTION



• "Never Send a Boy to Do a Man's Job" might have been satisfactory philosophy in the days when an employee's muscles and back were his main stock in trade. Now, when industry has mechanical equipment to supplant much of the old-time manual labor, production is largely dependent upon able supervision and inteligent direction. This article proves that one company's investment in our youth of today "paid off," and that Apprentice Training is destined for a prominent place in post-war industry.

By
FRED B. SKEATES
Link-Belt Co.
Chicago

IN 1935, the Pershing Road Chicago plant of Link-Belt Co. decided to adopt and put into effect an Apprentice Training Course. This was done under the able leadership of E. L. Berry, at that time assistant general manager at this plant and the present vice-president in charge of production.

The purpose of this effort was to develop and provide for skilled men, with the added hope that some of the men trained might become shop supervisors.

The foundry plan, as developed, covered a four-year course of practical work in both the iron and steel foundry. One year was divided between the Production and Time Study Departments. Whenever it was possible, we made arrangements permitting our trainees to spend time at the other foundries of our company.

It was also agreed—and, I am happy to say, carried out—that at no time would the trainee be penalized by loss of time, due to work shortage, or any other reasons. Our trainees were allowed to report every day the foundries operated, and we were able to carry through our program for each boy who qualified for the course.

The only qualification we set up at the time this program became effective was that the student be a high school graduate. Later, we sent our boys for an aptitude test, and it is surprising how few failed.

Our first group of foundry trainees started on their way in July, 1935. They were John Kubicki, Walter Balton, John Lubenkov, Emil Butwell and Frank Klimatis. We did not start a new group in 1936, but in 1937 we started Bert Elder, Morgan Hinckly and Chas. Kachinsky.

In 1938, we were unable to start any new boys, because we felt that we would not be able to train them properly without penalizing the other lads. But in 1939, we started Earl Pierce, John Wisniewsky, Fred Koenig and Frank Kalnes. In 1941, we started our last group of boys—Ed Prachal, Eugene Butler, Ed Gricus and Joe Ricter.

This makes a total of 16 foundry apprentices. There were also four pattern maker apprentices. One of these boys is now in charge of an Army Pattern Shop.

I sometimes shudder to think of the predicament we would have encountered had we not trained these lads.

In 1935, when we started our first group on this plan, our monthly production tonnage was around 350 tons of iron and 300 tons of steel. In 1937, we installed in both foundries a rather complete sand handling system and new methods in molding. By this time we had increased our tonnage in both foundries.

Shortly after the war began, we were told to consider increasing our tonnage to at least 600 tons from each foundry, which would amount to 1200 tons, from the same building and equipment. Of course, we did what other foundries had been forced to do—working double shifts —and that mean more supervision. But, the question was where could we get this type of help?

Let me answer that question this way. The five lads who started their trainee period in 1935 are now employed as follows: Kubicki, Production man; Balton, Foreman, Steel Foundry; Lubenkov, Foreman, Melting Dept.; Butwell, Foreman, Machine-Molding, Steel Foundry; Klimatis, Time Study Dept.

Two of the three boys who started in 1937 are now assigned to the following posts — Elder, Foreman, Steel Foundry; Hinckly, Foreman, Steel Squeezer Floor. Chas. Kachinsky has left our employ.

And, of course, the Army and Navy has their share of our boys. The three boys we started in 1939 are assigned posts as follows—Pierce, U. S. Navy; Wisniewski, 1st Lt., U. S. Army Ord.; Koenig, U. S. Navy; Kalnes, Foreman, Sprocket Floor. Likewise, the boys we started in 1941 are working for Uncle Sam. Prachal is in the U. S. Marines; Butler, U. S. Navy; Gricus, U. S. Army; and Ricter is on a flat-top in the Navy.

Today, any one of these lads would have been qualified to take over the responsibility of supervising a department, as all reports from the various services are satisfactory.

We plan to resume this training course as soon as the war ends and "material" again becomes available. It is difficult for me to understand how any foundry can afford to operate without an Apprentice Training Plan.

BRITISH FOUNDRYMEN
Investigate Basic Cupola Operation
TO REDUCE SULPHUR AND PHOSPHORUS

• This second instalment of a report of the Melting Furnaces Sub-Committee of the Technical Committee, Institute of British Foundrymen, is the examination of results obtained in practice with basic-lined cupolas. It is reprinted here from the "Foundry Trade Journal" because of the interest it will have for foundrymen in this country.

IN metallurgical processes concerned with the removal of phosphorus, certain fundamental reactions occur, comprising the oxidation of the phosphorus constituent to iron phosphate, followed by its ultimate removal in the slag as calcium phosphate. The phosphorus is retained in the slag only when the latter is strongly basic, and to a certain extent oxidizing.

The retarding effect of silicon is very pronounced, and its removal is considered necessary before the phosphorus can be effectively eliminated. Preliminary work carried out in the basic cupola in an attempt to reproduce the above reactions in this type of furnace, is reported herewith.

Preliminary Melts with Pig Iron

Tables 4 and 5 give the results of two of the first melts using an all pig iron charge, the cupola used having an internal diameter of 24 in., and being fitted with a continuous tapping arrangement. It will be seen from these results that the amount of dephosphorization varied between 5 per cent and 50 per cent, but was in no way consistent, being almost dependent on the extent of the silicon removal.

In general, samples which showed the maximum silicon loss also gave the maximum amount of dephosphorization; as in Table 4, when the silicon had been reduced from 0.77 per cent to 0.05 per cent, 50 per cent dephosphorization was obtained. Table 6 gives the analyses of typical samples of slag produced on these two melts.

Dephosphorization of Steel Scrap, Wrought Iron and Pig Iron Charges

Tables 7, 8 and 9 give the results obtained in a series of melts using steel scrap as the base material of the charge; the phosphorus was increased in the charge by the addition of wrought iron and, at the same time, the limiting effect of silicon on dephosphorization was investigated.

The basic cupola used for these melts was of standard design, dimensional details of which are given in Table 10; this furnace being in regular production as part of a duplex cupola-electric furnace unit. Experimental melts followed the normal daily production with the exception of melts Ex. D.P. 9 and Ex. D.P. 12, which were conducted as entirely separate melts. The cupola is fitted with a continuous tapping arrangement previously described[2], and as the well of this furnace carries only a small weight of metal, with no intermediate ladle between cupola and electric furnace, frequent sampling at 5 minute intervals is necessary, the average of the samples giving a more representative analysis. The analytical results are, therefore, condensed in Tables 7, 8 and 9, and details of certain of the individual melts are given in Tables 11, 12, 13 and 14.

Table 7 indicates the extent of dephosphorization with a minimum percentage of silicon in the charge. Table 8 gives the results with varying amounts of silicon added to the charge in the form of ferrosilicon. In the series with no avoidable silicon present, some difficulty was experienced in operation, there being a tendency to bridging. The relatively small amount of silicon added in the second series appeared to offset this effect, and there were no apparent melting difficulties. Experimental results with steel scrap and pig iron charges are given in Table 9, and indicate that a certain

Table 4

PIG IRON MELT, EX. D.P. 1

	Per lb.	*T.C., per cent*	*Si, per cent*	*Mn, per cent*	*S, per cent*	*P, per cent*
		Details of Cupola Charge				
Pig iron	500	4.0	0.77	0.87	0.062	0.74
Limestone	15	—	—	—	—	—
Spar	5	—	—	—	—	—
Ore	5	—	—	—	—	—
Coke	70	—	—	—	—	—
Coke bed	—	42 in.	—	—	—	—
Melting rate	—	3,400 lb. pr hr.				

COMPOSITION, PER CENT

Time, a.m.	*T.C.*	*Si*	*S*	*Mn*	*P*
10:45	3.85	0.29	0.064	0.38	0.42
11:00	—	0.24	0.070	0.35	0.40
11:15	3.86	0.29	0.074	0.35	0.44
11:30	3.80	0.19	0.076	0.29	0.40
11:45	3.82	0.14	0.080	0.37	0.45
p.m.					
12:00	3.88	0.05	0.084	0.30	0.36
12:15	3.90	0.45	0.060	0.40	0.62
12:30	3.66	0.24	0.056	0.40	0.55
12:45	3.91	0.24	0.064	0.46	0.50

Phosphorus reduction: Maximum, 51 per cent. Minimum, 16 per cent.

amount of dephosphorization of pig iron is possible with a high percentage of steel scrap.

Discussion of Results

As with other processes concerned with dephosphorization, if any useful degree of phosphorus removal is to be obtained, the silicon must be removed by intense oxidation. In the present series of experiments, using pig iron only in the charge, Tables 4 and 5, the iron ore added with the intention of creating an oxidizing slag, proved to be almost ineffective. The low FeO content of the slag (Table 6) indicates that the iron ore was reduced by the incandescent coke at a higher level than the melting zone.

With low silicon materials, as in the experiments using steel scrap, Table 7, up to 80 per cent dephosphorization was obtained without the addition to the charge of an oxidant. This suggests that in the absence of silicon, the molten droplets of metal are easily oxidized and this inherent oxidization is sufficient to allow the iron oxide formed to react with the phosphorus. As shown in Table 8, the inclusion of ferrosilicon in the charge reduced the dephosphorization to around 40 per cent, but the reduction was not in proportion to the quantity of ferrosilicon added. In this series, the silicon is not present in that portion of the metal charge to be dephosphorized, as distinct from the pig iron experiments, where both silicon and phosphorus are present in the same constituent of the charge. The series reported in Table 9 indicates the limiting effect of pig iron additions on dephosphorization, the object of each melt being described in the Table.

Reviewing the results as a whole, it may be deduced that, when the silicon is present in that constituent of the charge to be dephosphorized, the phosphorus reduction is relatively low, depending to a certain extent on the percentage of the high phosphorus constituent in the charge.

Alternatively, when the silicon is not present in the portion of the charge to be dephosphorized, and is concentrated in a small percentage of the charge (as ferrosilicon) as in Table 8, the possibility of phosphorus removal is greater (compare Table 5).

The experimental work so far carried out has shown that, if conditions are suitable for the removal of phosphorus, desulphurization is restricted. Oxidizing conditions favorable to dephosphorization are unfavorable to desulphurization.

It should be noted that the total quantity of phosphorus lost by the metal has not been accounted for in the slag (Tables 11, 12, 13 and 14), the constitution of which is in no way comparable with that of dephosphorizing slags associated with other processes. It may be assumed that such a cupola slag would be incapable of retaining any quantity of phosphorus as calcium phosphate due to its low oxidizing properties and relatively low basicity, compared with dephosphorizing slags produced in the electric and open-hearth furnaces.

As the cupola lining material used in these experiments was stabilized dolomite which contains up to 20 per cent silica, the slag basicity was undoubtedly lower than it would have been with a more basic refractory, such as magnesite. An analysis of the fritted portion of the lining, taken from the melting zone, showed a certain amount of phosphorus absorption to the extent of 0.30 per cent. This, however, does not account for the total quantity of phosphorus removed; the remainder may possibly be discharged with the stack gases, but a preliminary attempt to absorb it in water was unsuccessful.

Table 5

PIG IRON MELT, EX. D.P. 2

	Details of Cupola Charge	
	Lb.	
Pig iron	500	(Analysis same as Ex. D.P. 1)
Limestone	20	
Spar	10	
Ore	10	
Coke	70	
Coke bed	—	42 in.
Melting rate	—	3,860 lb. per hr.

COMPOSITION, PER CENT

Time, a.m.	*T.C.*	*Si*	*S*	*Mn*	*P*
9:30	3.99	0.19	0.080	0.43	0.58
10:00	4.08	0.34	0.074	0.38	0.54
10:15	4.12	0.34	0.066	0.59	0.64
10:30	4.14	0.35	0.070	0.62	0.61
10:45	4.07	0.29	0.070	0.55	0.58
11:00	4.09	0.49	0.080	0.48	0.70
11:15	3.97	0.53	0.084	0.50	0.66
11:30	4.0	0.34	0.084	0.53	0.65
11:45	4.12	0.34	0.064	0.44	0.68

Phosphorus reduction: Maximum, 27 per cent. Minimum, 5 per cent.

NOTE: The analyses in Tables 4 and 5 are from samples taken from the metal as it was melted and they are not representative of any particular quantity of metal.

Table 6

SLAG ANALYSIS—PIG IRON MELTS

	Ex. D.P. 1, per cent	*Ex. D.P. 2, per cent*
SiO_2	28.80	27.40
Al_2O_3	10.37	11.54
CaO	44.00	45.20
MgO	11.40	13.86
FeO	1.14	1.00
MnO	1.44	1.65

Lining Wear

It should be pointed out that lining wear over long periods when operating a cupola under the oxidizing conditions necessary for dephosphorization has not yet been studied. Although experience has shown that, when a basic cupola is worked under the relatively non-oxidizing conditions required for desulphurization, lining erosion is not more severe than in an acid cupola. However, it is possible that operating conditions will have some influence on lining life. From the short experimental melts so far carried out under conditions favorable to dephosphorization, there is no evidence that excessive attack on the lining may be expected.

The present work reveals the ne-

Table 7

DESULPHURIZATION WITH MINIMUM SILICON IN CHARGE

Melt No.	Metal Charge: Steel Scrap, lb.	Metal Charge: Wrought Iron, lb.	Charge Comp., per cent: Si	Charge Comp., per cent: P	Average Final Analysis, per cent: Si	P	Mn	S	T.C.	Phosphorus Reduction, per cent	Remarks
Ex. D.P. 7	1,300		0.30	0.060	0.20	0.022	0.15	0.120	2.50	63.3	
Ex. D.P. 8	1,300		0.30	0.060	0.34	0.029	0.21	0.130	2.70	52.0	
Ex. D.P. 9	900	400	0.20	0.133	0.062	0.028	0.16	0.110	2.60	79.0	Wrought iron, 0.30% P. Steel Scrap, 0.060.
Ex. D.P. 5	975	325	0.23	0.200	0.20	0.053	0.17	0.110	3.06	73.5	Wrought iron, 0.60% P. Steel Scrap, 0.060.
Ex. D.P. 6	720	580	0.20	0.300	0.16	0.065	0.13	0.100	2.85	78.0	Wrought iron, 0.60% P. Steel Scrap, 0.060.
Ex. D.P. 12		1,300	0.050	0.60	Tr.	0.12	Tr.	0.130	2.70	80.0	Wrought iron, 0.60% P.

Table 8

DEPHOSPHORIZATION WITH SILICON PRESENT

Melt No.	Melting Charge: Steel Scrap, lb.	Melting Charge: Wrought Iron, lb.	Melting Charge: Ferro-Silicon (78 per cent Si), lb.	Charge Comp., per cent: Si	Charge Comp., per cent: P	Average Final Analysis, per cent: Si	P	Mn	S	T.C.	Phosphorus Reduction, per cent	Remarks
Ex. D.P. 13	1,300		10	0.90	0.060	0.33	0.035	0.27	0.110	2.70	41.0	
Ex. D.P. 14	1,300		16	1.26	0.060	0.70	0.036	0.25	0.090	2.54	40.0	
Ex. D.P. 15	1,300		30	1.80	0.060	0.97	0.039	0.29	0.090	2.70	35.0	
Ex. D.P. 17	1,100	200	20	1.37	0.110	1.06	0.061	0.28	0.069	2.70	45.0	Wrought iron, 0.40% P. Steel scrap, 0.06%.
Ex. D.P. 16	1,100	200	35	2.15	0.110	1.50	0.059	0.27	0.082	2.86	46.4	Wrought iron, 0.40% P. Steel scrap, 0.06%.

Table 9

DEPHOSPHORIZATION WITH PIG IRON AND STEEL SCRAP CHARGES

Melt No.	Charge, lb.: Steel Scrap	Charge, lb.: Wrought Iron	Charge, lb.: Pig Iron	Charge, lb.: Mill Scale	Charge Composition, per cent: Si	Charge Composition, per cent: P	Average Final Analysis, per cent: Si	P	Mn	S	T.C.	Total Phos. Reduction, per cent	Phos. Reduction in Pig Iron*, per cent	Remarks
Ex. D.P. 10	1,150		150		0.40	0.140	0.30	0.077	0.26	0.070	2.98	45	35	Pig Iron: 3.80, 2.30, 0.76, 0.90, 0.046 *Object*—To use high phos. pig iron to replace hematite iron in Tropenas charge.
Ex. D.P. 11	1,040		260		0.40	0.30	0.15	0.21	0.31	0.103	3.10	30	32	Pig Iron: 3.80, 1.20, 1.25, 0.80, 0.060 *Object* — To find the limiting effect of silicon when present in the phosphorus-rich portion of the charge.
Ex. D.P. 18	900		400		0.37	0.257	0.35	0.19	0.45	0.083	2.82	26	20	Pig Iron: 4.0, 0.76, 0.70, 0.97, 0.107 *Object*—As Ex. D.P. 11.
Ex. D.P. 20	900		400	30	0.37	0.257	0.26	0.185	0.48	0.130	2.84	28	21	Pig Iron: As Ex. D.P. 18. *Object* — To attempt oxidation of phosphorus with Mill Scale.
Ex. D.P. 19	840	200	260		0.95	0.107	0.67	0.064	0.41	0.097	2.80	40		Pig Iron: 3.80, 3.75, 0.053, 0.87, 0.097 *Object* — To find the limiting effect of Silicon when the phosphorus is present in the low-silicon portion of the charge

*Calculated on the assumption that the phosphorus in the steel scrap was reduced to 0.025 per cent (*See* melts Ex. D.P. 7 and Ex. D.P. 8.)

cessity for a considerable amount of further experiment before any positive theory of the nature of the reactions can be formed. The relatively small amount of dephosphorization which was obtained in the above reported experiments on pig iron appears to justify a continuation of the work which would probably involve some modification in the design of the cupola.

In order to intensify the dephosphorization, some means should be found of inducing a more oxidizing condition in the melting zone, and work could be carried out on the effect of operating with excess air and low coke bed heights consistent with obtaining metal at a reasonable spout temperature. Further attempts should be made to create a slag with a composition more strongly basic and oxidizing. Investigation could be made on the use of larger quantities of limestone and lime, and its effect on increasing the basicity of the slag.

The continuous tapping system employed in the reported experiments may have some bearing on the results, as in this method of operation, the well contains a relatively large volume of slag with a minimum quantity of metal.

Therefore, any well reactions would be modified in the more conventional type of cupola using intermittent tapping as the ratio of slag to metal, and the contact time would

Table 10

DETAILS OF PRODUCTION CUPOLA

1—Diameter of shell	60 in.
2—Internal diameter of lining	36 in.
3—Number of tuyeres in bottom row	6-9 in. by 3 in.
4—Number of tuyeres in top row	6-7 in. by 3 in.
5—Height from base plate to center of bottom tuyeres	3 ft. 4½ in.
6—Height from centers of bottom tuyeres to centers of top tuyeres	2 ft.
7—Height from base plate to top of basic lining	11 ft.
8—Height from base plate to charging sill	21 ft. 6 in.
9—Approximate wind belt pressure	12-15 in. water gauge.
10—Approximate tapping temperature of metal during tests	2642° F. to 2696° F., taken with optical pyrometer read on corrected scale.

be totally different. The effect of these two factors together with receivers and well depth require to be examined. It would, of course, be an obvious advantage to obtain simultaneous dephosphorization and desulphurization, and, with a more intimate knowledge of the reactions, this dual reaction may prove to be possible.

Applications of the Basic Cupola

The opportunity offered by the basic cupola for desulphurization has obvious applications in the manufacture of steel by the converter process, and also in processes where low sulphur cupola melted metal is required to be tapped direct into a batch-type furnace for duplexing, as in the manufacture of short cycle anneal malleable, etc.

It may be also of value in enabling charges containing large proportions of scrap to be used in the production of light castings and in other applications where cupola melted metal of consistently low sulphur content is required.

The work so far carried out on dephosphorization implies a fulfillment of certain immediate requirements of the cupola-converter process, and possible advantages to this process may be stated as follows:

1. To make possible use of higher phosphorus steel scrap.

2. To substitute higher phosphorus pig iron for hematite iron in the cupola charge.

3. To produce a steel with lower phosphorus content than is normally obtained from the acid converter, thus closely approaching the analysis of basic electric steel.

4. To offset the phosphorus increase in the steel produced due to the metallic losses in the cupola and converter.

Successful application to practice will depend on obtaining economical refractory life and in the development of a correct operating procedure, best determined by practice based on a more complete understanding of the reactions involved. The basic cupola may also prove of value for the melting of ferroalloys, such as ferromanganese, where the slag produced is of a nature which rapidly attacks an acid lining.

An aspect of the subject not considered in this report, but which is engaging the attention of the subcommittee, is the influence of basic cupola melting of the properties of gray cast iron. The work of Heiken suggests that an abnormal pickup of carbon may be expected, but no confirmation of this has been obtained so far when operating a basic cupola under conditions favorable for desulphurization. It will be noted also that the carbon contents reported in the section on dephosphorization are of the same order as those obtained when melting similar mixtures in an acid furnace.

Table 11

DETAILS OF MELT, EX. D.P. 9

Cupola Charge

	Wrought Iron and Steel Scrap					*Slag Analysis*							
Sample No.	*C*	*Si*	*Mn*	*P*	*S*	SiO_2	Al_2O_3	*CaO*	*MgO*	*FeO*	*MnO*	*S*	*P*
C 1	2.82	0.67	—	0.045	—	—	—	—	—	—	—	—	—
C 2	3.03	0.14	0.20	0.030	0.120	—	—	—	—	—	—	—	—
C 3	2.92	0.14	—	0.025	—	—	—	—	—	—	—	—	—
C 4	2.75	0.096	0.20	0.029	0.120	—	—	—	—	—	—	—	—
C 5	2.82	0.096	—	0.022	—	—	—	—	—	—	—	—	—
C 6	2.63	0.096	0.15	0.023	0.122	28.0	15.46	38.41	13.61	1.74	2.05	—	0.026
C 7	2.53	0.096	—	0.023	—	—	—	—	—	—	—	—	—
C 8	2.55	0.048	0.15	0.025	0.112	—	—	—	—	—	—	—	—
C 9	2.51	0.048	—	0.027	—	—	—	—	—	—	—	—	—
C 10	2.54	0.048	0.13	0.027	—	—	—	—	—	—	—	—	—

Average phosphorus, 0.028 per cent.

Calculated phosphorus in charge, 0.133 per cent.

Details of Cupola Charge

Steel scrap, lb.	900
Wrought iron scrap, lb.	400
Coke, lb.	216
Fluorspar, lb.	20
Limestone, lb.	100
Bed height above top tuyeres, in.	46
Air supply, lb. per min.	250

Average Analysis

Si	*Mn*	*P*	*S*
0.20	0.46	0.06	0.07
0.05	0.15	0.33	0.05

Table 12

DETAILS OF MELT, EX. D.P. 13

Cupola Charge—Steel Scrap and Ferrosilicon

	Metal Analysis					Slag Analysis							
Sample No.	*C*	*Si*	*Mn*	*P*	*S*	SiO_2	Al_2O_3	*CaO*	*MgO*	*FeO*	*MnO*	*S*	*P*
C 27	2.76	0.53	—	0.038	0.110	—	—	—	—	—	—	—	—
C 28	2.85	0.24	0.30	0.038	0.116	—	—	—	—	—	—	—	—
C 29	2.45	0.29	—	0.034	0.120	33.20	9.12	43.33	11.08	1.00	1.75	0.53	0.056
C 30	2.73	0.29	0.25	0.030	0.110	—	—	—	—	—	—	—	—
C 31	2.72	0.29	—	0.037	0.100	—	—	—	—	—	—	—	—

Average phosphorus, 0.035 per cent.
Average silicon, 0.33 per cent.

Calculated phosphorus in charge, 0.060 per cent.
Calculated silicon in charge, 0.90 per cent.

Details of Cupola Charge

		Average Analysis			
		Si	*Mn*	*P*	*S*
Steel scrap, lb.	1,300	0.20	0.46	0.06	0.07
Ferrosilicon, lb.	10	78.00			
Coke, lb.	216				
Fluorspar, lb.	20				
Limestone, lb.	100				
Air supply, lb. per min.	250				

Table 13

DETAILS OF MELT, EX. D.P. 17

Cupola Charge—Steel Scrap, Wrought Iron and Ferrosilicon

	Metal Analysis					Slag Analysis							
Sample No.	*C*	*Si*	*Mn*	*P*	*S*	SiO_2	Al_2O_3	*CaO*	*MgO*	*FeO*	*MnO*	*S*	*P*
C 17	2.54	1.05	—	0.058	0.070	—	—	—	—	—	—	—	—
C 18	2.78	1.19	0.26	0.053	0.066	—	—	—	—	—	—	—	—
C 19	2.71	1.01	0.23	0.051	—	—	—	—	—	—	—	—	—
C 20	2.47	0.91	0.30	0.066	0.068	35.4	8.10	44.8	9.65	1.10	1.26	0.69	0.19
C 21	2.65	0.96	0.32	0.075	0.070	—	—	—	—	—	—	—	—
C 22	2.75	1.19	0.31	0.067	0.068	—	—	—	—	—	—	—	—

Average phosphorus, 0.061 per cent.
Average silicon, 1.06 per cent.

Calculated phosphorus in charge, 0.11 per cent.
Calculated silicon in charge, 1.37 per cent.

Details of Cupola Charge

		Average Analysis			
		Si	*Mn*	*P*	*S*
Steel scrap, lb.	1,100	0.20	0.46	0.06	0.07
Wrought iron scrap, lb.	200	0.05	0.15	0.40	0.05
Ferrosilicon, lb.	20	78.00			
Coke, lb.	216				
Fluorspar, lb.	20				
Limestone, lb.	100				
Air supply, lb. per min.	250				

Table 14

DETAILS OF MELT, EX. D.P. 19

Cupola Charge—Wrought Iron, Steel Scrap and Hematite Pig Iron

	Metal Analysis					Slag Analysis							
Sample No.	*C*	*Si*	*Mn*	*P*	*S*	SiO_2	Al_2O_3	*CaO*	*MgO*	*FeO*	*MnO*	*S*	*P*
C 20	2.94	0.96	0.40	0.055	0.100	—	—	—	—	—	—	—	—
C 21	2.91	0.86	0.45	0.064	0.078	—	—	—	—	—	—	—	—
C 22	2.70	0.53	0.41	0.063	0.102	—	—	—	—	—	—	—	—
C 23	2.70	0.38	0.40	0.066	0.102	—	—	—	—	—	—	—	—
C 24	2.78	0.70	0.40	0.065	0.100	34.8	9.83	38.14	10.19	0.95	2.73	0.78	0.126
C 25	2.78	0.58	0.40	0.069	0.098	—	—	—	—	—	—	—	—

Average phosphorus, 0.064 per cent.
Average silicon, 0.67 per cent.

Calculated phosphorus in charge, 0.107 per cent.
Calculated silicon in charge, 0.95 per cent.

Details of Cupola Charge

		Average Analysis			
		Si	*Mn*	*P*	*S*
Steel scrap, lb.	840	0.25	0.55	0.060	0.070
Wrought iron, lb.	200	0.05	0.20	0.400	0.050
Hematite pig iron, lb.	260	3.75	0.87	0.053	0.050
Coke, lb.	216				
Fluorspar, lb.	20				
Limestone, lb.	00				
Air supply, lb. per min.	250				

A.F.A. HONORS FIVE MEMBERS
for Outstanding Contributions in the SERVICE OF THE FOUNDRY INDUSTRY

To
C. E. Sims
The John A. Penton
Gold Medal

To
R. E. Kennedy
The Jos. S. Seaman
Gold Medal

M. J. Gregory

A. H. Van Keuren, U.S.N.

R. J. Teetor

TWO Gold Medals of A.F.A. and five Honorary Life Memberships were voted to outstanding men of the industry at the Board of Awards meeting, held January 16, in Chicago. Here are the 1945 awards and, in brief, the bases on which they were made:

To C. E. SIMS, Supervising Metallurgist, Battelle Memorial Institute, Columbus, Ohio . . .

The JOHN A. PENTON Gold Medal of A.F.A. . . . *"because of his outstanding contribution to the Steel Casting Industry."*

To R. E. KENNEDY, Secretary, American Foundrymen's Association . . .

The JOSEPH S. SEAMAN Gold Medal of A.F.A. . . . *"for outstanding meritorious service to all branches of the Foundry Industry through his work in organizing and guiding the development of technical and operating papers and discussions, and his untiring encouragement to all A.F.A. Chapters, committees and members."*

Honorary Life Memberships

To M. J. GREGORY, retired . . . *"for his contribution to the Association and the Foundry Industry."*

To A. H. VAN KEUREN, Rear Admiral, U.S.N., Director, Naval Research Laboratory, Washington, D. C. . . . *"in recognition of his efforts in behalf of the Foundry Industry."*

To R. J. TEETOR, Cadillac Malleable Iron Co., Cadillac, Mich. . . . *"for his contribution to the American Foundrymen's Association and the Foundry Industry as President of A.F.A. for 1944-1945."*

To C. E. SIMS and R. E. KENNEDY, as 1945 Medallists.

The report of the Board of

Awards for 1945 was unanimously approved by the Board of Directors on January 17. Presentations will be made to the men thus honored, at the annual meeting of the Association, to be held during July at the time of the annual Board meeting, as announced elsewhere in this issue. Because of cancellation of the 1945 Foundry Congress, the 1945 recipients of medals and life memberships will be further and publicly honored before the industry at the next annual meeting of the Association to be held after present wartime restrictions have been removed.

The Awards Board

Personnel of the Board of Awards is composed of the last seven living past Presidents of the Association, with the most immediate past President serving as the Chairman. The 1945 Board included the following:

Chairman, L. C. Wilson, Reading Steel Casting Div., American Chain & Cable Co., Reading, Pa.

D. P. Forbes, Gunite Foundries Corp., Rockford, Ill.

H. S. Simpson, National Engineering Co., Chicago.

L. N. Shannon, Stockham Pipe Fittings Co., Birmingham, Ala.

H. S. Washburn, Plainville Castings Co., Plainville, Conn.

Marshall Post, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

H. Bornstein, Deere & Co., Moline, Ill.

Biographical sketches of the men honored by the Board of Awards this year are given below.

R. E. KENNEDY

ROBERT E. KENNEDY is known to more foundrymen throughout the United States than is perhaps any other single man in the industry. Recognition of his organizational work, extending over the past 25 years, with the award of the Joseph S. Seaman Gold Medal of A.F.A., is a tribute to the valuable service he has performed on behalf of every phase of metal casting.

It has been largely through the efforts of Bob Kennedy that hundreds of valuable technical and operating papers have been prepared for presentation at A.F.A. Conventions. It was largely Bob Kennedy's untiring effort which resulted in the organization of A.F.A. Chapters, and his encouragement and counsel that developed them from small beginnings. So long has he been identified with A.F.A. that it is possible to overlook his fine record in the industrial phase of foundry work prior to his long connection with the Association.

Born in Vincennes, Ind., in 1887, he graduated from Winona Technical Institute, Winona, Ind., in 1909 after specializing in foundry practice, and later from the University of Illinois in industrial education. From 1910-1917 he was instructor in foundry practice at the University, and Assistant Professor in Charge of Foundry Practice from 1919-1921. During his business career he was employed as Chemist with Mitchell Motor Car Co., Racine, Wis.; Molder at Rumley Oil Pull Tractor Co., LaPorte, Ind.; Coremaker at Stover Gas Engine Works, Freeport, Ill.; Molder at Central Foundry Co., Vincennes, Ind.; Time Study Man, Packard Motor Car Co., Detroit; Assistant Foundry Superintendent, Dunham Co., Berea, Ohio; and Mechanical Methods Engineer, Foundry Department, Western Electric Co., Chicago. During World War I he obtained considerable experience in the steel foundry of Watertown Arsenal, Watertown, Mass.

Upon discharge from the Army in 1919, Mr. Kennedy became Assistant Superintendent of the U. S. Training Service, Foundry Training, Department of Labor, where he prepared a bulletin on "Industry Training for Foundry Workers." He returned to the University of Illinois as Superintendent of the foundry until 1921, when he was appointed Assistant Secretary of A.F.A. In 1925 he was elected Technical Secretary, and in 1938 Secretary. As Secretary, he also was elected the Chief Administrative Officer of the Association in 1943.

Over the years, Bob has been identified with many outstanding improvements within the foundry industry. He played a most active part in the development of sand control for foundries, in pattern standardization, improvement of foundry refractories, and many other projects that have proved of outstanding value wherever metals are cast. Tribute to his innate modesty and primary sense of service to others is the fact this form of biography could not have been published in AMERICAN FOUNDRYMAN with his consent.

* * *

C. E. SIMS

CLARENCE E. SIMS, Supervising Metallurgist of Battelle Memorial Institute, Columbus, Ohio, is a Past Director of A.F.A. and has long been active in the technical work of the Association. As recipient of the J. A. Penton Gold Medal of A.F.A., this honor is well deserved for he has presented numerous papers to A.F.A. meetings and served on many committees of the Association, especially in connection with the improvement of steel castings procedures.

Mr. Sims has written widely for the technical press on subjects such as Melting Units and Methods, Heat Treatment, Synthetic Cast Iron, Refractories and Inclusions. In 1932 he was co-author with G. A. Lillieqvist of a paper on "Inclusions and Their Effect, Solubility and Control in Cast Steel," presented before the A.I.M.E. This paper won the co-authors R. W. Hunt award for the best paper on iron and steel presented before that group.

A native of Chicago, this 1945 medalist received his early education there and graduated from the University of Illinois with a B.S. degree in Chemical Engineering. He then earned his Master of Science degree at the University of Utah. Entering industry, he served in various capacities with the Anaconda Copper Mining Co. in Montana; Michigan Electrochemical Co., Menominee, Mich.; R. W. Hunt Co., Chicago; Research Division of Chemical Warfare Service, Washington, D. C.; Aluminum Co. of America, Niagara Falls, N. Y.; U. S. Bureau of Mines Experimental Stations in Seattle, Wash., and Pittsburgh, Pa.; and American Steel Foundries, East Chicago, Ind.

Early in 1937 he assumed his present position with Battelle, and the cooperation with that organization and A.F.A. has resulted in the preparation of much valuable data for the foundry industry. He also is active in the new Central Ohio Chapter of the Association.

M. J. GREGORY

M. J. GREGORY, now retired, is well known for his work as Factory Manager of the Foundry Div., Caterpillar Tractor Co., Peoria, Ill. A member of A.F.A. for many years, and a past Director (1931-1934), the awarding of an Honorary Life Membership to "Greg" will be a popular action.

Mr. Gregory began his industry career as an apprentice at Brown and Sharpe Mfg. Co., Providence, R. I. He also studied at Brown University and at the Massachusetts Institute of Technology, where he was a student of metallography under the direction of the late Dr. Albert Saveur. Several important operating papers on foundry techniques were prepared by him for presentation at various technical meetings. Under his direction a "model" foundry staffed almost exclusively by women was set up at Caterpillar for the production of aluminum airplane cylinder heads.

A. H. VAN KEUREN, U.S.N.

REAR ADMIRAL A. H. VAN KEUREN, USN, was awarded Honorary Life Membership in A.F.A. as Director of the Naval Research Laboratory, Washington, D. C., because of the many valuable contributions to foundry techniques made by that Naval Service under his direction. A remarkable number of technical papers prepared by Associates of Admiral Van Keuren have been prepared and freely released for presentation before meetings of A.F.A. and other technical societies. In fact, the record of cooperation between the Naval Research Laboratory and the industry is one of the finest achieved during the present schedule.

The foundry industry owes much to development and test work on cast metals carried on at the Naval Laboratory, and great credit must go to the Directorship of the Laboratory for the freedom of which such information has been made available.

Hamilton Promotion Work Aids Foundry Industry

THROUGH the pages of *American Foundryman,* members of the Association have had called to their attention the excellent program of The Hamilton Foundry & Machine Co., Hamilton, Ohio, and its employer-employee relations work.

This company recently has broadened its program and is doing a fine piece of work in keeping the foundry industry before the citizens of its community. It has also reached out in its program into the schools and has made an attempt to interest teachers in the local schools in the work done at its plants.

That its efforts are meeting with success is shown by the fact that the magazine *Ohio Schools* recently published an article on the visits of Hamilton school teachers to the plant of The Hamilton Foundry & Machine Co.

It is such work as this on the part of foundries which will build respect and admiration for the industry in communities and redound to the benefit of the industry in the minds of the citizens of its communities.

Of course, to undertake such a program and to establish community interest, foundries must have plants of which they are proud and into which they would not hesitate to bring the public. They must have plants that will instill into their visitors an appreciation of the work the industry is doing and the conditions under which its employees work.

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Committee on Chill Tests Meets in Cleveland

THE Gray Iron Division on Chill Tests met at Hotel Statler, Cleveland, Ohio, on Friday, January 26, to review the work done thus far by the committee. This committee is charged with the development of a standard chill test for the gray iron castings industry. The purpose of such development is to assist foundrymen in comparing test data on the same basis. It is difficult to compare chill test data between shops when a variety of chill test specimens are used and when there is no uniformity in technique or interpretation of the results obtained. The committee is preparing a report to be submitted to the membership on the activities of the committee, and the report will propose a tentative specification for chill tests.

It was decided at this meeting that the committee will proceed with a program of correlating chill test results with physical properties of the respective irons under investigation, which will be presented to the industry as soon as it is completed. Personnel of the Gray Iron Division Chill Test Committee is as follows:

T. E. Barlow, Battelle Memorial Institute, Columbus, Ohio, *Chairman.*

K. Geist, Allis-Chalmers Mfg. Co., Milwaukee, Wis., *Secretary.*

A. L. Boegehold, General Motors Research Lab., Detroit, Mich.

Geo. Johnstone, Cooper-Bessemer Corp., Grove City, Pa.

D. E. Krause, Battelle Memorial Institute, Columbus, Ohio.

D. E. LeHane, Jr., Westinghouse Electric and Manufacturing Co., Trafford, Pa.

J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala.

W. B. McFerrin, Electro Metallurgical Co., Detroit, Mich.

H. W. Stuart, U. S. Pipe and Foundry Co., Burlington, N. J.

H. H. Wilder, Vanadium Corp. of America, Detroit, Mich.

H. C. Winte, Worthington Pump and Machinery Corp., Buffalo, N. Y.

R. J. Zemanek, United States Graphite Co., Saginaw, Mich.

WALLS AND WOOD HEAD SLATE
of Officer and Director Nominees

For President, 1945-1946:

FRED J. WALLS, International Nickel Co., Detroit.

For Vice-President, 1945-1946:

S. V. WOOD, Minneapolis Electric Steel Castings Co., Minneapolis.

The above nominations for President and Vice-President of A.F.A. head the slate of new National Officers and Directors selected by the 1945 Nominating Committee, meeting January 15 at the Palmer House, Chicago. Mr. Walls, at present Vice-President of the Association, was nominated to succeed R. J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich. Mr. Wood now is completing a three-year term as a National Director.

Directors Nominated

Both the President and Vice-President of A.F.A. serve for terms of one year. Nominated for Directors, to serve three-year terms, are the following:

F. M. WITTLINGER, Texas Electric Steel Casting Co., Houston.

H. H. JUDSON, Goulds Pumps, Inc., Seneca Falls, N. Y.

JAMES H. SMITH, Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich.

GEORGE K. DREHER, Ampco Metals, Inc., Milwaukee.

E. W. HORLEBEIN, Gibson & Kirk Co., Baltimore, Md.

In addition to the nominees chosen, R. J. Teetor will serve a one-year term as Director, as the immediate past President, in accordance with the Association's by-laws, revised effective July 1, 1944.

New Nominating Procedure

This report of the Nominating Committee is published in accordance with Article X, Sec. 4, of the By-laws, which requires that the committee chairman report the names of nominees to the A.F.A. Secretary for publication to the membership at least 60 days prior to the Annual Business Meeting. It is required that the Nominating Committee meet at least 90 days prior to the Annual Business Meeting to select candidates for such offices as shall become vacant at the annual meeting of the Board.

Selection of Committee

Personnel of the 1945 Nominating Committee was selected, for the first time, in accordance with the by-laws provision that gives A.F.A. Chapters an increased voice in naming committee candidates. Under this provision, the Board of each Chapter eligible, annually may select two candidates for the Nominating Committee from the local membership, "preferably representing different

Fred J. Walls

S. V. Wood

Geo. K. Dreher

Jas. H. Smith

H. H. Judson

E. W. Horlebein

F. M. Wittlinger

branches or divisions of the industry within the membership."

Such names must reach the A.F.A. President by July 1st, and prior to November 1st the Executive Committee of the Board appoints a Nominating Committee of seven. Six of these must be selected from the Chapter lists, and one may be from non-Chapter territory. These seven, together with the last two living past Presidents, form a committee of nine members, with the senior past President acting as Chairman.

Last year not all the Chapters took advantage of their opportunity to present names of likely candidates for the Nominating Committee, due perhaps to some misunderstanding of the newly established procedure. It is hoped, however, that all Chapters hereafter will be represented when called upon by Secretary R. E. Kennedy to submit their lists of candidates.

1945 Committee Personnel

Members of the 1945 Nominating Committee, and divisions and Chapter areas they represent, were as follows:

Chairman, Past President D. P. FORBES, Gunite Foundries Corp., Rockford, Ill.—*rep. malleable, gray iron, steel; Northern Illinois & Southern Wisconsin Chapter.*

Past President L. C. WILSON, Reading Steel Casting Div., American Chain & Cable Co., Reading, Pa.—*rep. steel; Philadelphia Chapter.*

R. K. GLASS, Republic Steel Corp., Buffalo, N. Y.—*rep. equipment and supplies; Western New York Chapter.*

MARTIN J. LEFLER, Strom Brass Foundry, Elkhart, Ind.—*rep. non-ferrous; Michiana Chapter.*

W. E. MAHIN, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—*rep. gray iron; non-Chapter area.*

HENRY F. MCFARLIN, The Lunkenheimer Co., Cincinnati—*rep. non-ferrous, gray iron, steel; Cincinnati Chapter.*

CHAS. MORRISON, Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich.—*rep. malleable; Saginaw Valley sec. of Detroit Chapter.*

JOHN W. PORTER, American Steel Foundries, East Chicago, Ind.—*rep. steel; Chicago Chapter.*

E. P. TROUT, Lufkin Foundry & Machine Co., Lufkin, Texas—*rep. gray iron; Texas Chapter.*

A brief "Who's Who" of each of the 1945 nominees is given herewith so that the membership may better know the men selected.

* * *

F. J. Walls

FRED J. WALLS, Metallurgist for the International Nickel Co., Detroit, and nominated as President of A.F.A., has a long and excellent record of service in many activities of the Association. He served as a Director in 1939-1942 and has long been a member or chairman of numerous committees of the Gray Iron Division, as well as General Chairman of that Division. He also presented the 1930 exchange paper of A.F.A. to the Institute of British Foundrymen.

Over the years, Fred Walls has become a familiar figure to most of A.F.A. Chapters, before which he has presented many technical and practical talks. While National Vice-President during the past year, and, therefore, Chairman of the National Membership Committee, the membership of A.F.A. has increased to over 7,300 and is still growing. He has greatly interested himself in encouraging youth to consider foundry work as a career, for which he recently was named Chairman of the new Youth Encouragement Committee of the Board of the American Foundrymen's Association.

A native of Michigan, Fred Walls received his technical education at the University of Michigan, specializing in metallurgy. Thereafter, he became associated with Packard Motor Car Co., Detroit, and later with Wilson Foundry & Machine Co., Pontiac, Mich., becoming Chief Metallurgist in 1923. He was Consulant in 1932 to Eaton-Erb Foundry Co., Vassar, Mich (now the foundry division of Eaton Mfg. Co.), and acted as Manager prior to his present work as Manager of the Detroit office, Development and Research Div., International Nickel Co.

A past President of the former Detroit Foundrymen's Association, now the Detroit Chapter of A.F.A., Mr. Walls is also a past Chapter Director. In addition, he is an active member of S.A.E., A.S.M., A.S.T.M. and the Engineering Society of Detroit.

S. V. Wood

SHELTON V. WOOD, recently nominated as Vice-President of A.F.A., is President and Manager of Minneapolis Electric Steel Castings Co., Minneapolis. Just completing a three-year term as a Director, "Shelly" has become well known on the Board for his sincere belief in the foundry industry and his faith in its future. His own career is a cast in point.

A native of Iowa he was graduated from the University of Minnesota, Minneapolis, with a degree in mining engineering and until 1913 pursued a career as an Engineer with such organizations as the Great Northern Railroad; Seager Engine Co., Lansing, Mich., and a Consultant Engineer in Minneapolis.

In 1913 he decided that the foundry industry offered him the business opportunities he sought and became affiliated with his present company. He was active in the work of the former Twin City Foundrymen's Association and was one of those responsible for its becoming an A.F.A. Chapter, serving as a Chapter Director. Mr. Wood's great interest in the importance of the work of A.F.A. on behalf of all branches of metal castings resulted in his appointment last fall to Chairmanship of a new Management Committee of the Board, a Committee which has great possibilities.

His interest in technical society activities is shown by his membership in A.F.A., A.I.M.E., A.S.M., the Steel Founders Society of America and the Minneapolis Engineers Society. Active also in University of Minnesota affairs, he has been serving on the Board of Regents.

George K. Dreher

GEORGE K. DREHER, a Director nominee of A.F.A. for 1945-1948, has been especially active in Association work. While serving as Chairman of the Wisconsin Chapter of A.F.A., he was instrumental in carrying on the progressive programs for which that Chapter has become well known, and still serves as a Director. He is also a Past Chairman of the Milwaukee Chapter of A.S.M. and a member of the Army Ordnance Association.

George is a native of Michigan but received his education in the State of Wisconsin, first in grade and

high schools of Milwaukee and later at Lawrence College, Appleton. From 1930 until recently he was Plant Manager of Ampco Metal, Inc., of Milwaukee, and today he is Vice-President in Charge of Manufacturing. He has contributed a number of articles to the trade press and meetings of technical societies, mainly on the metallurgy and founding of bronze.

E. W. Horlebein

EDWIN W. HORLEBEIN, a past President and present Director of the Chesapeake Chapter of A.F.A., has been President of the Gibson & Kirk Co., Baltimore, Md., for the past 20 years. As a nominee for a Directorship in A.F.A., his enthusiasm and long period of activity in technical society affairs has made him widely known to many foundrymen and engineers.

After early education at the Polytechnic High School in Baltimore, Md., his birth-place, he served as a Machine Apprentice with the Baltimore & Ohio RR from 1915-1918 before entering World War I as a Lieutenant of Field Artillery. Following military service he was associated with the Dixie Mfg. Co. of Baltimore as an Engineer until becoming the head of his present company.

"Ed" Horlebein is not only a member of A.F.A., but also of A.I.M.E., A.S.M., A.S.M.E., A.S.T.M., the National Founders Association and the British Institute of Metals.

H. H. Judson

HAROLD H. JUDSON, Foundry Superintendent, Goulds Pumps, Inc., Seneca Falls, N. Y., is a most logical nominee as an A.F.A. Director, and a practical foundryman of considerable note. Well known for his developments in the production of high strength iron for large pressure pump castings, his paper on this subject before the 1932 A.F.A. Convention still is remembered. In 1936 he prepared the A.F.A. exchange paper to the Institute of British Foundrymen and has presented a number of technical and practical papers on cast iron before meetings of A.F.A. and A.S.T.M. He has served on a number of committees of the A.F.A. Gray Iron Division over the past years.

Born in Holyoke, Mass., Mr. Judson graduated from Worcester Polytechnic Institute in 1923 with a degree of B.S. in Mechanical Engineering. For three years thereafter he served as Foundry Engineer with the Riley Stoker Corp., Detroit, before entering the employ of Goulds Pumps as Foundry Superintendent, a position he holds to this day.

James H. Smith

JAMES H. SMITH, as General Manager of Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich., has been nominated as a Director in A.F.A. for his broad experience in the field of malleable iron, dating back some 25 years. He is active in both A.F.A. and the Malleable Founders Society.

A native of Saginaw, his business career has been continuously associated with the State of Michigan, beginning with a position as Accountant with Buick Motor Div. of General Motors in 1915. Returning from the Army in 1919 he became connected with Saginaw Products Co. and in 1921 began his connection with Saginaw Malleable Iron Div. . . . first in supervisory work, then as Production Manager 1930-1937, as Works Manager 1937-1941, and as General Manager in 1941.

F. M. Wittlinger

FREDERICK M. WITTLINGER, nominated as an A.F.A. Director, if elected will be the first representative of the Texas Chapter to serve on the A.F.A. Board. Secretary of Texas Electric Steel Casting Co., Houston, Tex., he also is Chairman of the Texas Chapter of A.F.A. and was a large factor in the creation of that group and in building up its membership.

As a native of Ohio, he attended public schools in Middletown and received technical education at Ohio Mechanics Institute, Cincinnati. Thereafter, he served as Chemist with the U. S. Cast Iron Pipe Co., Addyston, Ohio; Supt. at Mal-Gra Casting Co., Cambridge City, Ind.; Steel Foundry Supt., American Rolling Mill Co., Middletown; and General Manager of Midwest Casting Co., Middletown, from 1919-1926. Since 1927 he has been associated with his present company.

"Witt's" enthusiasm in helping to organize and promote the first Chapter in the Southwest area has been a prominent factor in that group's success. He also is a past Chairman of the Texas Chapter of A.S.M., and active in the Steel Founders Society of America.

Book Review

Experimental Stress Analysis, Proceedings of the Society for Experimental Stress Analysis, vol. 2, no. 1. Addison-Wesley Press, Inc., Cambridge, Massachusetts, 1944. Cloth bound, 8½x11¼ in., 225 pages, illustrated. Price, $5.00.

Contains papers presented before the Society's Spring Meeting and Symposium on Residual Stresses, held at the Hotel Statler, Boston, Massachusetts, May 18-20, 1944. Twenty-one papers on stress measurement, stress analysis, and residual stresses.

Consider Committee On Chemical Analyses

AT the 1944 convention of your Association, the program incorporated a session on methods of chemical analysis used in the castings industry. This session covered interesting information on wet methods and spectrographic methods.

Since that time, your Association has been interested in organizing a small committee whose purpose would be to bring to the attention of foundry chemists improvements in methods and equipment used in the analysis of foundry materials and products. Thus far, your Association has been unable to ascertain whether there would be, among foundry chemists, any interest in such a committee.

Your National Office Staff, therefore, requests that anyone interested in serving on such a committee, and particularly any individual who would be willing to act as chairman and organize such a committee, make his willingness known by addressing a letter or communication to Director, Technical Development Program, American Foundrymen's Association, 222 W. Adams St., Chicago 6, Ill.

ADEQUATE CONTRAST
To Delineate the Common Defects
IN X-RAYING MAGNESIUM PARTS

• As visual inspection methods take on new importance in the production of sound castings, this article discusses the most suitable densities for several thicknesses of metal. The material is reprinted from the May 15, 1944, issue of "Aero Digest."

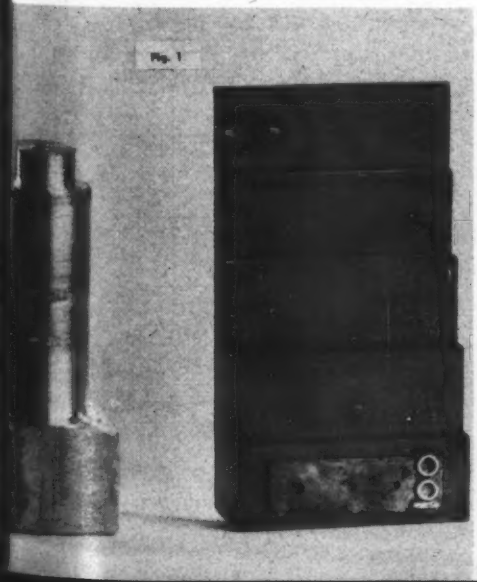
By
ROBERT TAYLOR
Consulting Radiologist
Pullman, Wash.

THE X-ray inspection of magnesium alloys offers comparatively little difficulty, if time and care are taken to ascertain the radiographic qualities of the type of film used in conjunction with the kilovoltage employed, and the thickness of metal investigated. However, oxide, flux and sand inclusions have radiographic densities so close to that of magnesium, as to necessitate an exacting selection of film and exposure time, in order to bring out sufficient film contrast for their detection as discontinuities.

Suitable Contrast

Various researches have shown that the most suitable contrast for X-ray inspection is found in the region of densities extending from 2.0 to 2.5. To obtain a closer approximation, the present study was undertaken. This study indicated that, at a density of 2.45, a film contrast sufficient to reveal a sensitivity of 1 per cent in the radiography of magnesium alloy castings can be obtained with the proper type of film.

To make this study the standard parameter tests were employed for the purpose of determining the most suitable densities for several thicknesses of metal. The alloy used was AN-QQ-M-56, Composition A, which is the same as Dowmetal H and (ASTM 4). A step-tablet (Fig. 1) was made from this alloy, in steps ranging in thickness from ⅛ in. to 1 in.



This step-tablet was placed over the film and holder, with suitable parameters in position over each thickness of the tablet, in order that the clarity of the penetrameter images could be determined for each thickness of metal. Ansco-Superay "B" film was chosen because of its fine grain and high contrast characteristics.

The exposure factor was plotted as focal-film distance in inches squared, which equaled 0.5 ($FFD^2 = 0.5$), and a kilovoltage was selected (Fig. 5) that would just penetrate a given thickness of magnesium, making certain that there would be no overpenetration. The overpenetration of metal by radiation will ruin the best efforts of any operator to secure satisfactory contrast.

Predetermined Readings

The results of the exposures (Figs. 2, 3 and 4) were matched with strips of film, the density of which had been predetermined by photometer readings. From these studies it was found that the penetrameter outline and holes of varying diam showed optimum detail definition at a density of 2.45, whereas at densities of 1.5 and 2.0 the images were either not recognizable or were delineated with considerable difficulty.

Following this, a small casting (Fig. 1) with a 1-in. oval hub on a square flange was selected, at random, and in the upper surface on the hub were milled grooves representing 1 per cent and 2 per cent, respectively, of its total thickness. Before exposing the radiographs, the applicable 1-in. penetrameter was placed in position on the step-tablet as a double check on the sensitivity present in the exograms. This is shown in the radiographs (Figs. 2, 3 and 4).

Densities of 2.40 to 2.50 Give Good Sensitivity

Films were exposed at densities of 1.5, 2.0, and 2.45, and the following determinations were made from the radiographs: At a density of 1.5 (Fig. 2), the 1 per cent groove and penetrameter were not visible; the 2 per cent groove was faintly visible in part.

At a density of 2.0 (Fig. 3), the small 1 per cent slot was partially visible, but was not shown with clarity, either in part or in whole. The penetrameter was visualized with considerable difficulty even though it was a 2 per cent penetrameter. At a density of 2.45 (Fig. 4), both the penetrameter and the 1 per cent groove were clearly outlined in their entirety.

This showed conclusively that for good sensitivity in the radiography of magnesium alloys, densities of from 2.40 to 2.50 are necessary to properly delineate the defects common to these alloys. Fine areas of microshrinkage, fine cracks, flux, and sand inclusions, as well as oxide folds, will not be detected at the lower densities, and films should, therefore be exposed at the higher densities for adequate film contrast.

The following conclusions may be drawn from these studies:

(1) The film used in radiography of magnesium alloys should possess the finest grain available.

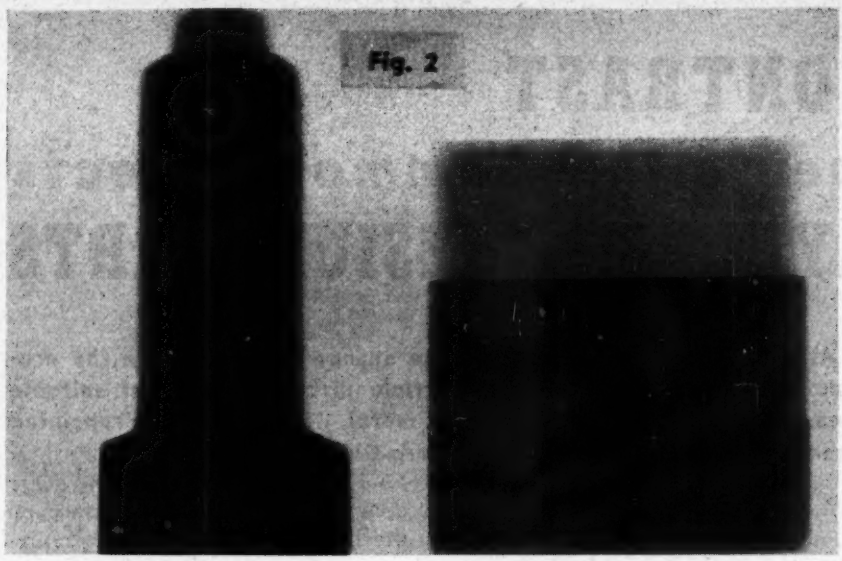


Fig. 2

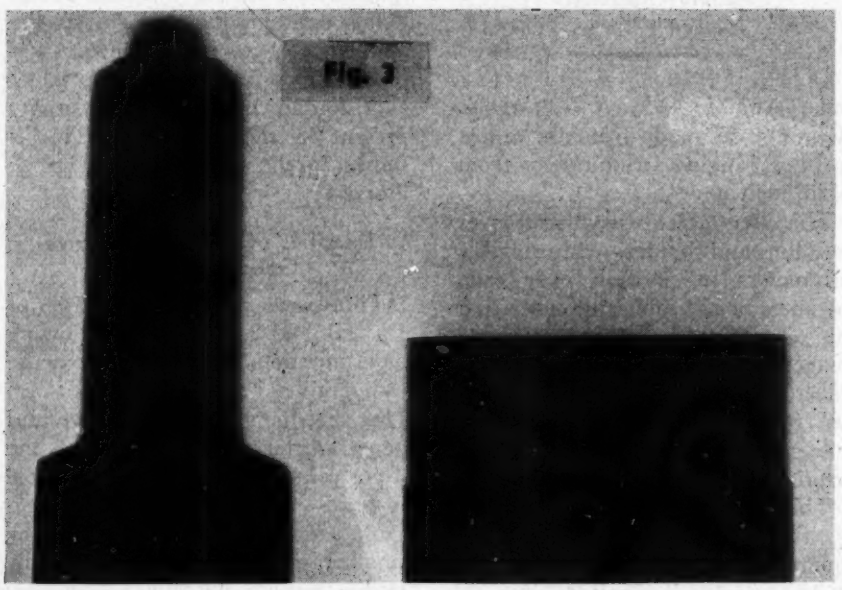


Fig. 3

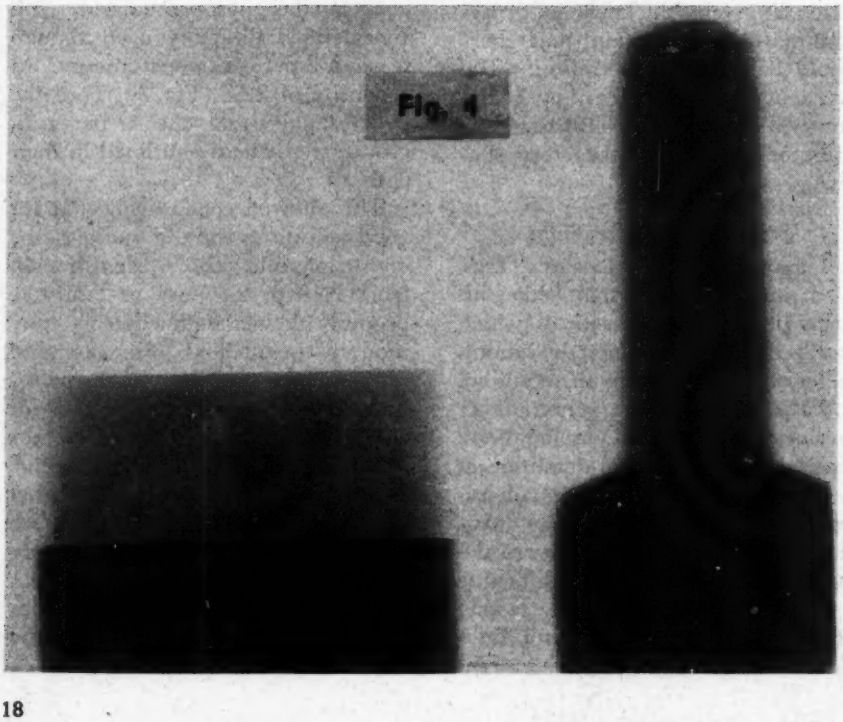


Fig. 4

(2) The exposure factor for direct exposure should be approximately FFD^2, which equals 0.5.

(3) The kilovoltage should be adequate for the penetration of the specimen being radiographed, but should in no case be excessive, or contrast will be reduced in proportion.

(4) Adequate lead background and shielding should be used to reduce scattered radiation, which, if present, will increase density and reduce sensitivity, by producing a fogging effect on the film.

It might also be stated that calcium tungstate intensifying screens are definitely contra-indicated in the radiography of magnesium alloys. Where sections are not uniform in thickness, and scattered radiation tends to reduce the sensitivity of inspection, lead foil antimony alloy screens should be employed. Their characteristics have been explained in the literature, many times. A method utilizing two lead-foil screens as a means of facilitating inspection on complicated sections has been developed.

Position Is Important

The importance of properly positioning castings at the time of exposure, especially those with a complicated structure, cannot be overemphasized. Some castings, by virtue of irregular contour and location of various thicknesses in different planes, present a real problem in positioning, to bring out the detail on the X-ray film of all the areas of interest.

It is necessary, in order to properly radiograph any casting, that the sub-surface continuity be examined in its entirety. In the case of a casting such as shown in Fig. 6, it would

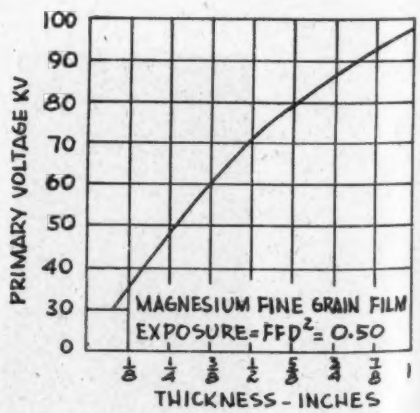


Fig. 5

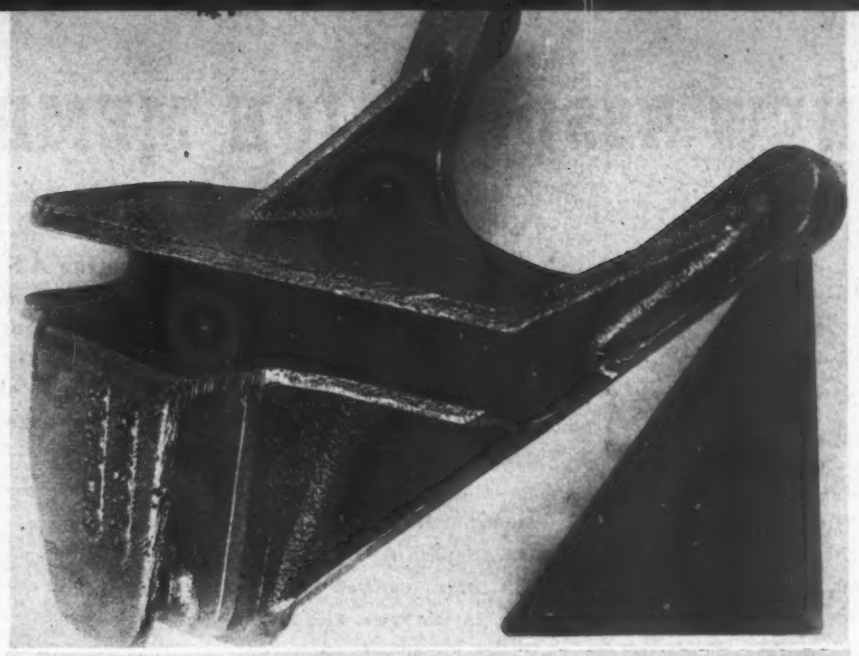
require numerous exposures to cover the various sections and thicknesses. This casting consisted of 10 shells ⅛ in. thick, five bosses approximately ⅜ in. each in thickness and numerous fillets. Similar designs are common in aircraft castings.

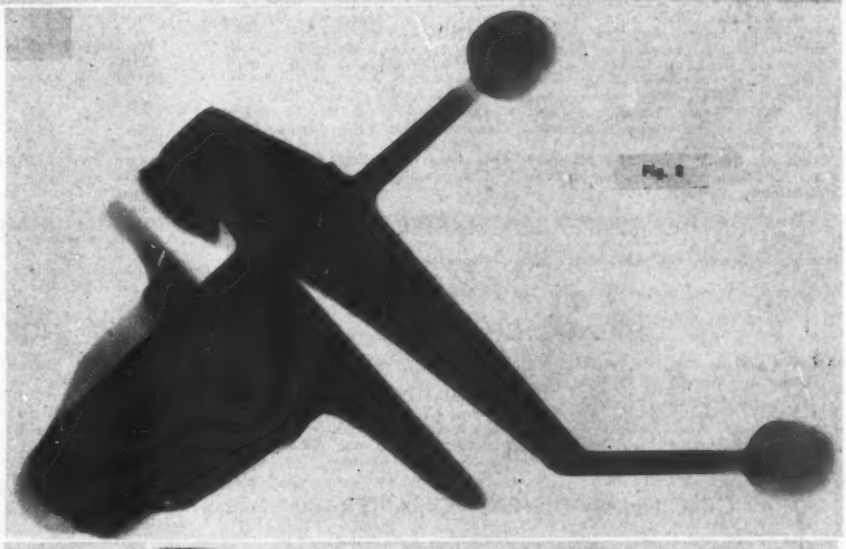
Two radiographs (Figs. 7 and 8) showed the casting to be perfectly sound and free of objectionable discontinuities. However, a close visual check revealed an area of doubt, in a portion of one of the shells, which led to the exposing of an additional radiograph (Fig. 9), in a different plane.

To facilitate holding the casting in position for this exposure a small wooden jig was placed under one end (Fig. 6). This radiograph revealed a region of translucency, in the area of suspicion, which was interpreted as a very fine crack, and the casting was rejected.

Small wooden jigs aid materially in positioning castings of complicated shape, as the part must remain rigidly immobile during exposure. Also, the plane of the section being examined must be parallel to the plane of the photographic film, otherwise the comparative film densities and radiographic delineation will be distorted and the inspector's determinations vitiated thereby.

As a rule it will be found that, even with many and varied sections and shapes, complicated designs can be satisfactorily inspected with approximately two exposures at right angles to one another. However, a close visual observation of a casting will often reveal whether or not an added exposure is indicated.





Committee on Defects Holds February Meeting

A MEETING of the Committee on Analysis of Castings Defects was held at the A.F.A. offices, Chicago, Saturday, February 17. Considerable attention was devoted to the study of scrap castings which were brought to the meeting as well as to pictures to be used for illustrating the various defects.

Defects numbered 25 to 28 were studied and revised to conform to the latest method of presentation. The problem of having castings conform to the various specifications was discussed at length; likewise, the real cause of scrap.

NEW ASSOCIATION MEMBERS

(January 16 to February 15, 1945)

• Again the indicator on the A.F.A. membership chart swings sharply upward, as the total for the monthly period just closing officially reads 166 new members and four conversions from Personal to Company Memberships. Twenty-six out of the 29 chapters deserve a share of the credit for this fine showing, with Detroit leading with 26 new names, four of which are members of the Saginaw Valley Group.

Conversions—Personal to Company

***Attalla Pipe & Foundry Co., Attalla, Ala. (J. M. Franklin, Pres.) (Birmingham Chapter).**
***Foundry Supply Co., St. Paul, Minn. (Norman E. Wisner, Rep.) (Twin City Chapter).**
***R. C. Hitchcock & Sons, Minneapolis, Minn. (Carleton C. Hitchcock, Partner) (Twin City Chapter).**
***Oregon Brass Works, Portland, Ore. (A. R. Prier, Vice-Pres.).**

BIRMINGHAM CHAPTER

Chas. E. Ard, Stockham Pipe Fitting Co., Birmingham.
Frank Davenport, Chemist, Lee Bros. Foundry Co., Anniston, Ala.
Charles B. Saunders, Sales Office, Woodward Iron Co., Birmingham.
***J. M. Tull Metal Supply Co., Atlanta, Ga. (J. F. Nation, Sales Engr.).**

CENTRAL INDIANA CHAPTER

Victor Graves, Mgr., Industrial X-Ray Co., Indianapolis.
Harold Norman, Casting Buyer, Cummins Engine Co., Columbus, Ind.

CENTRAL NEW YORK CHAPTER

Karl E. Reynolds, A. P. Green Fire Brick Co., Syracuse, N. Y.

CENTRAL OHIO CHAPTER

L. H. Bowsher, Chief Process Insp., Ohio Steel Foundry Co., Lima, Ohio.
Wm. W. Champion, Supv., Bonney Floyd Steel Casting Co., Columbus.
Grover C. Dearth, Finishing Supt., Columbus Malleable Iron Co., Columbus.
H. E. Doerr, Lima Rep., Frederic B. Stevens, Inc., Lima, Ohio.
Omer Fancy, Foundry Supt., H. B. Salter Mfg. Co., Marysville, Ohio.
***Globe Iron Co., Jackson, Ohio (Edwin A. Jones, Pres.).**
***Huber Mfg. Co., Marion, Ohio (A. J. Tower, Foundry Supt.).**
W. R. Huffman, Plant Mgr., H. B. Salter Mfg. Co., Marysville, Ohio.
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William C. Wick, Naval Research Laboratory, Anacostia 20, D. C.

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Roy Kruck, Foundry Supt., Alloy Casting Co., Champaign, Ill.
C. J. Michael, Asst. Engineer of Tests, Crane Co., Chicago.
Herbert J. Niemann, Field Service Engr., Hydro-Blast Corp., Chicago.
Frank Urbaytis, Chemist, American Brake Shoe Co., Melrose Park, Ill.

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Semsettin Iyigun, Student, U. of Michigan, Ann Arbor.
Carl Kilwinski, Sales Order Dept., Detroit Gray Iron Foundry, Detroit.
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Samuel M. Skeen, Asst. Mgr., Wayne Foundry Co., Detroit.
Jerry Theiring, Schmieg Industries, Detroit.
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Russell F. Marande, Met., Dow Chemical Co., Midland, Mich.
Harry W. Rigg, Control Met., Saginaw Malleable Iron, Saginaw.

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W. Harold Leathers, Research Engr., Winchester Repeating Arms, New Haven, Conn.
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E. Millhouse, Asst. P. A., Auto Specialties Mfg. Co., St. Joseph, Mich.
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Paul F. Cheader, Foreman of Chippers & Grinders, Pacific Brass Foundry of S. F., San Francisco.
George S. Clark, Jr., Foundry Met., Permanente Metals Corp., Permanente, Calif.

*Company Member

Wm. R. Hancock, Asst. Foreman, Enterprise Engine & Foundry Co., So. San Francisco.
Hjalmar W. Jorgensen, Patternmaker, Pacific Brass Foundry of S. F., San Francisco.

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Frank A. La Rosa, Foundry Foreman, Allis-Chalmers Mfg. Co., Milwaukee.
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***Slinger Foundry Co., Slinger, Wis. (M. W. Gleisner, Supt.).**
Edmund Szymczak, Foreman, Pelton Steel Casting Co., Milwaukee.

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Hugh Glover Goyns, Works Mgr., Jarrow Metal Industries, Ltd., Durham, England.
John Ikin, Foundry Mgr., Messrs. Crossley Bros., Ltd., Openshaw, Manchester, England.
Livraria Kosmos (Capt. M. Muylaertz), Rio de Janeiro, Brazil.
B. C. McFadden, Aluminum Co. of America, Pittsburgh, Pa.
***Nevada Fur and Wool Co., Reno, Nev. (James Sutton, Mgr.).**
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CHAPTER ACTIVITIES News

See page 29 for list of Chapter representatives whose reports of local activities appear in this issue.

APPRENTICE TRAINING
Is Studied by E. Canada & Newfoundland

G. Ewing Tait

"APPRENTICE Training on the Canadian National Railways" was the subject very ably presented by A. H. Williams, General Supervisor of Apprenuce Training, at the January meeting of the Eastern Canada and Newfoundland Chapter.

Mr. Williams outlined the methods used in the selection of apprentices and the statistics he maintains to keep the number of apprentices in each trade in balance with the normal separations. It is his policy never to start more apprentices than the shops can absorb as journeymen, thus guaranteeing the boys jobs on completion of their training.

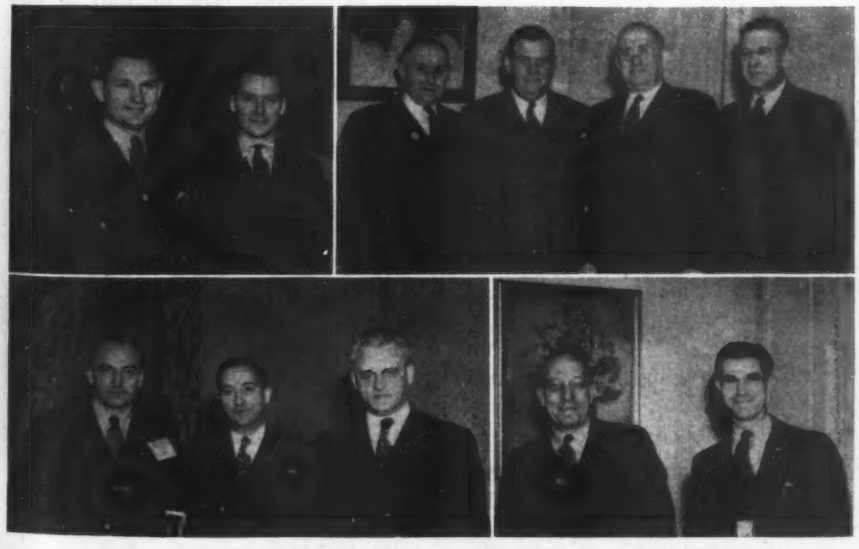
He went on to outline the shop and classroom training covering a five-year period, offered to boys in the various trades. The courses are designed to ensure that the boys have an opportunity to work in every branch of their trade, within the scope of railway work. Two hours a week classroom study are provided for on company time, instruction being given in mathematics, drawing and trade theory.

Mr. Williams emphasized that the success of the training lay in having a definite schedule of shop work, special supervision and instruction, and supervisors who took a personal interest in the boys and offered them the encouragement which is so necessary if their interest is to be maintained. The boys are not kept as helpers, but given full responsibility for work within their capabilities.

At the conclusion of Mr. Williams' talk there was much discussion as to how the C.N.R. should have no difficulty in obtaining the required number of apprentices for the foundry or any other trade, while general industrial foundries in the Montreal area were finding it almost impossible to attract boys.

While various factors, such as following in their fathers' footsteps, and somewhat better pay in the railway shops are partly responsible, the boys probably give most consideration to (a) the fact that they are offered a definite training program and (b) the fact that the railway offers continuity of employment. If the industrial foundries would or could offer the same advantages they would have no trouble in attracting apprentices.

Henri Louette, Warden King, Ltd., Montreal, outlined a lecture on "Fundamentals of Foundry Practice," to be given by the Educational Committee in February and March. E. N. Delahunt, also of Warden King, Ltd., Montreal, Chairman of the Regional Conference Committee, described the arrangements for a Conference in Montreal May 16 and 17. A program of talks, group discussions and plant visits is being arranged. Sufficient accommodation has been secured for all those who may wish to attend, but Mr. Delahunt emphasized that reservations must be made early.



(Photos courtesy John Bing, A. P. Green Fire Brick Co.)

Pictures of the speakers and guests of honor at the Wisconsin Chapter's January 12 meeting, held at Hotel Schroeder, Milwaukee.

Round Table Sessions At Chesapeake Meeting

By E. J. Hubbard

CHAPTER Chairman H. A. Horner, Frick Co., Inc., Waynesboro, Pa., presided at the Chesapeake group's January 25 Round Table Meeting at the Engineers' Club, Baltimore. Chairman Horner introduced the leaders of

(Photos courtesy C. A. Roebeck, Gibson & Kirk Co.)

A lively dinner meeting preceded the round table sessions at the January 25 get-together at the Chesapeake Chapter meeting, held at the Engineers' Club, Baltimore.

three groups: Andrew Shaw, Link Belt Co., Philadelphia; Paul Ade, Naval Gun Factory, and W. Gross, American Radiator and Standard Sanitary, Bayonne, N. J.

Mr. Shaw presided over a lively discussion involving cupola operation, casting cleaning, coke problems and miscellaneous gray iron foundry practice problems, which attendant members of this group had encountered during the past year.

Mr. Ade presided over the group in which the discussion hinged around gating and risering of brass and bronze, and the casting defects usually encountered and their method of elimination.

H. F. Taylor, Naval Research Laboratory, Anacostia, D. C., assisted Mr. Gross as the leader of the cast steel session. New and better methods of core drying were discussed with considerable mention being given to the use of infra red drying. The methods of carbon control in electric furnace melting, hardenability measurements, the ramming of sand for testing purposes, and the stress relieving of castings also offered opportunity for brisk discussion.

TIME STUDY DEMONSTRATION

Proves Real Drawing Card for Chicago

OVER 300 members and guests were at hand to witness the time and motion demonstration presented by Jas. H. Smith and Stuart D. Martin, Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich., at the Chicago Chapter's February 5 meeting, held at the Chicago Bar Association Restaurant.

Chapter Chairman A. S. Klopf, Firegan Sales Co., Chicago, introduced C. P. Wright, Brake Shoe and Castings Div., American Brake Shoe Co., Chicago, who in turn introduced the speakers of the evening.

Mr. Smith compared time and motion study to an analyses of the steps involved in using a pen . . . of removing the pen from one's pocket, unscrewing the top, using the pen, replacing the cap and placing the pen back in the pocket. If a person worked at a desk and had occasion to use a pen many times during the day, how much time and effort would have been saved if a desk pen with holder had been substituted for the pocket type? The speaker said that time and motion study was as simple as that.

To illustrate the fundamentals of motion and time study as applied to the foundry, a demonstration of a simple core job was staged, with Mr. Martin in the role of core maker. Mr. Martin proceeded to make some cores, using the method which was typical before time and motion study was started in their plant.

While Mr. Martin was going through the process, Mr. Smith was making a running commentary about the location of the various tools that were being employed. He pointed out how the operator had to bend over, how he had to take steps in order to place the cores on the plate, and other wasted motions.

The bench was then raised to a better working level, the sand was placed in a hopper at a more desirable location, a definite conveniently located place was provided for the rammer and the strike-off, as well as a definite location for the wires used in the demonstration. In making the cores under the new setup, the core box was jolted, both hands were used in placing the wires, and a simple body motion was used in placing the cores on the plate.

Actual timing during the foregoing operations by Frank E. Wartgow, American Steel Foundries, Chicago, a member of the A.F.A. Committee on Time Study and Job

Evaluation, disclosed that the new method was between 40 and 50 per cent more effective than the old method.

Slides were then presented, showing before and after conditions on many operations at the Saginaw plant, and disclosing the importance of proper levels and the elimination of fatiguing motions as a result of the proper placement of equipment and material. The slides also showed that in many cases it was possible to install women in certain jobs which previously had to be filled by men. Many of the changes did not require any capital outlay but, according to Mr. Smith, any expenditures made were definitely worth while.

Core Blowing Is Subject At Cincinnati Meeting

By J. Schumacher

APPROXIMATELY 100 members and guests attended the regular meeting of the Cincinnati Chapter, held at the Engineering Society Headquarters, Cincinnati, February 12, under the guidance of Chairman Wm. A. Rengering, Cincinnati Milling Machine Co., Cincinnati, to hear Lawrence D. Pridmore, International Molding Machine Co., Chicago.

Mr. Pridmore, in his subject of "Core Blowing," discussed the various types of core blowing equipment available and traced the history of the development of this method of making cores. He pointed out many of the pitfalls and discussed the factors of air pressure, sand mixes, venting and type of sand injectors. Slides were used to illustrate the diaphragm type of machine and the various kinds of core boxes that can be used in the blowing of cores.

Western New York Meets With Rochester Chapter

By J. Ralph Turner

WESTERN New York and Rochester held a scheduled joint meeting February 3, Hotel Buffalo, Buffalo, with approximately 200 in attendance. Reinhold D. Loesch, Lake Erie Foundry Co., Buffalo, Chairman of the Western New York Chapter, welcomed nearly 50 members of the Rochester group, and Walter F. Morton, Anstice Co., Inc., Rochester, President of the Rochester Chapter, responded with appropriate remarks.

Charles W. Summers, Buffalo, a humorist, entertained the members and guests, after which a floor show was presented.

Prior to the entertainment, immediate Past Chairman Frank E. Bates, Worthington Pump & Machinery Corp., Buffalo, described the two foundry courses which are being held at University of Buffalo under the sponsorship of the Engineering, Science and Management War Training Program of the U. S. Government.

Nathan Janco Speaks To St. Louis Chapter

By Chas. E. Rothweiler

NATHAN JANCO, Centrifugal Casting Machine Co., Tulsa, was guest speaker of the February 8 meeting of the St. Louis Chapter, at the DeSoto Hotel, which was attended by 103 members and guests.

Mr. Janco brought out, in his talk and illustrative slides, the advantages of centrifugal casting in improving the quality and increasing the yield of the castings, both in ferrous and non-ferrous work. However, in some cases the speaker said, the static yield was sufficiently high not to warrant a change. A lengthy discussion period followed Mr. Janco's talk.

Detroit Chapter Reports On Two Regular Meetings

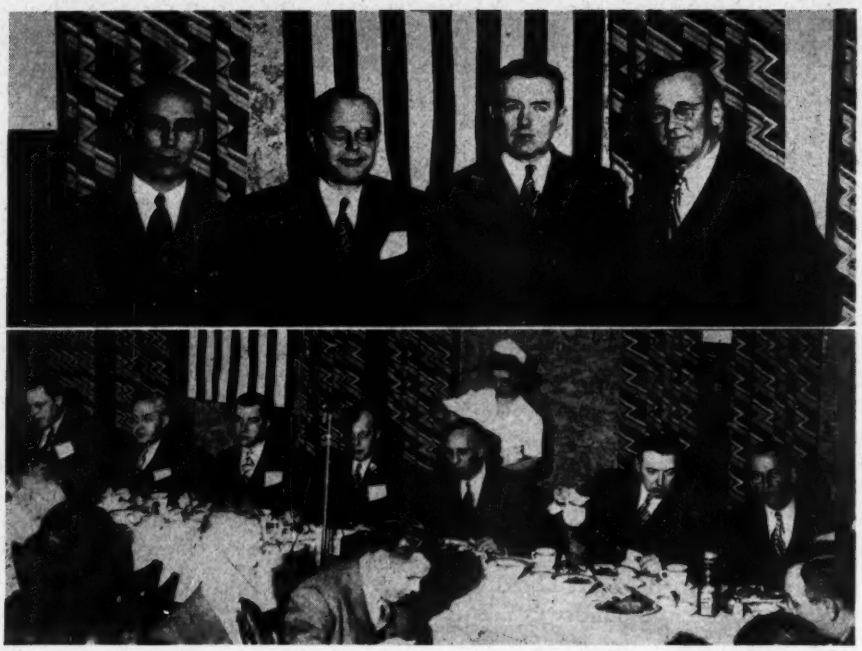
By H. H. Wilder

ROUND table meetings on three subjects featured the Detroit Chapter's February 15 meeting at the Rackham Memorial.

Following the dinner, F. A. Melmoth, Detroit Steel Castings Co., discussed his recent mission to England. An interesting talk was given on general conditions, but for security reasons not very much information could be divulged about the foundry status.

The steel group was headed by G. A. Timmons, Climax Molyb-

Past attendance records for the Annual Regional Conferences, sponsored jointly by the Wisconsin Chapter and the University of Wisconsin, can be forgotten because the 1945 event, at the Schroeder Hotel, Milwaukee, rang up a new high.



The "Big Four" seen in the upper photo, taken at the February 1 meeting of the Saginaw Valley Group, Fischer's Hotel, Frankenmuth, Mich., are (left to right): Chapter Chairman Chas. Morrison, Saginaw Malleable Iron Div., General Motors Corp.; F. J. Walls, International Nickel Co., Detroit, National A.F.A. Vice-President; A. L. Boegehold, General Motors Research Labs., Detroit, speaker; and Jas. H. Smith, also of the Saginaw Malleable Iron Div., General Motors Corp.

denum Co., Detroit. Mr. Timmons ably presented the metallurgical principles involved in the isothermal treatment of steel castings. G. Vennerholm, Ford Motor Co., Dearborn, Mich., was discussion leader.

Brass foundrymen heard H. L. Smith, Federated Metals Div., American Smelting & Refining Co., Perth Amboy, N. J., on "Effects of Water Vapor, Carbon Reaction and Temperature in Brass and Bronze Melting." Discussion leader for the group was J. P. Carrittee, Jr., of True Alloys Inc., Detroit.

The Aluminum group sponsored a session of interest to all foundrymen, with Vaughn Reid, City Pattern Foundry & Machine Co., Detroit, as speaker. Mr. Reid's subject was "Pattern Equipment for High Production Foundries." The leader of discussion was A. W. Stolzenburg, Aluminum Co. of America, Detroit.

January Meeting

"PLANNING the Foundry of Tomorrow" was the subject discussed by J. E. Linabury, General Motors Corp., Detroit, at the January 18 meeting of the Detroit Chapter, held at Rackham Educational Memorial.

Mr. Linabury was introduced by Chapter Chairman R. G. McElwee, Vanadium Corp. of America, Detroit, following the dinner and showing of the latest war films dealing with combat and supply operations of the U. S. Armed Forces. The films were shown through the courtesy of the War Department and Sixth Service Command.

The speaker outlined methods used in planning a foundry for producing automotive gray iron castings, as made on mechanized equipment. The views presented were all considered for improvement of working conditions in relation to building design, ventilation, dust collection, pouring systems, melting room, molding bays, core-making and cleaning.

In the discussion period many questions were asked from the floor relating to some of the ideas presented. The subject was fitting for all those looking forward to the post-war period for what it meant toward profit and production.

Texas Chapter Holds Meeting in Beaumont

By L. G. Stenzel

G. E. BRYANT, Jr., Oil City Brass Co., Hampton Mabry, Mabry Foundry & Machine Co., and X. R. Randall, Beaumont Cement Sales Co., all of Beaumont, Texas, were in charge of arrangements for the all-day meeting of the Texas Chapter held at Hotel Beaumont on January 22.

The afternoon was devoted to plant visitations and to golfing and concluded with discussions and refreshments at Hotel Beaumont. Members were taken on tours through any foundry of their choice, while the golfers were taken to the country club course.

V. A. Crosby, Climax Molybdenum Co., Detroit, was the speaker of the evening and gave an informative talk concerning the alloying of iron. While Mr. Crosby's talk was primarily for the iron man, the steel and non-ferrous men were equally interested.

Guests included E. R. Young, Climax Molybdenum, Chicago, and W. P. Wittke, Smith Oil & Refining Co., Rockford, Ill.

Saginaw Valley Group Discusses Cast Iron

By J. J. Clark

TWO hundred members and guests of the Saginaw Valley Group of the American Foundrymen's Association turned out for its February dinner meeting February 1 at the Fischer Hotel, Frankenmuth, Mich.

Guests of honor were the speaker, A. L. Boegehold, General Motors Research Metallurgist; F. J. Walls, National A.F.A. Vice-President, International Nickel Co., Detroit; R. G. McElwee, Chairman of the Detroit Chapter, Vanadium Corp. of America, Detroit, and Jas. H. Smith, Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich.

Mr. Boegehold's topic for the evening was "Modern Cast Irons." Slides were used to illustrate the effect of such factors as chemical composition, temperature, section size, and cooling rate in the mold upon the metal structure and upon physical properties.

The speaker discussed the beneficial effects of late additions of inoculating agents, such as silicon, titanium, and various proprietary alloys, sold for this purpose. Photomicrographs were used to illustrate

the effects on form and distribution of the graphite flakes. Properties and structures imparted to cast iron by the alloying elements, such as chromium, nickel, molybdenum, and vanadium, were shown by charts and photographs.

After-dinner entertainment was furnished by Lorenzo Sturkey, Midland, Mich., an amateur magician.

Central Ohio Discusses Use of Synthetic Sand

By Frank Kiper

THOS. E. BARLOW, Co-Chairman of the Central Ohio Chapter, Battelle Memorial Institute, presided at the group's January 16 meeting at the Fort Hayes Hotel, Columbus.

Following routine chapter business and announcements, Jack Lathrop, *"The Foundry,"* gave a coffee talk, dealing with anticipated needs of the foundry industry of America.

N. J. Dunbeck, Eastern Clay Products, Inc., Eifort, Ohio, then discussed "Fundamentals of Synthetic Sand." Mr. Dunbeck opened his talk with a few remarks on the nature of bond. He stressed the point that sands and clays are deposited by natural classification. Therefore, it is extremely difficult to find deposits which combine all the desired properties. It is much easier to compound synthetic sands from the more plentiful deposits of relatively pure sands and clays than to find the chance deposits which are compounded by nature to meet the exact quality for particular conditions.

Mr. Dunbeck outlined the comparative advantages and disadvantages of natural and synthetic sands. Either directly or indirectly, according to the speaker, the use of synthetic sands can be boiled down to economics. There are the disadvantages of fast drying, narrow workable moisture ranges, and the requirement of more equipment, he said, but durability, ease of control and flexibility, coupled with metallurgical advantages, make them the cheaper to use.

In closing, Mr. Dunbeck briefly discussed the selection of clays. In the discussion that followed, members cleared up many of the individual problems in the use of synthetic sand.

Round Table Meeting at Canton District Chapter

By Geo. M. Biggert

A CANTON District Chapter meeting was held at the Alliance Elks Club, February 15, 1945, with the Eastern sector of the group serving as hosts.

Four discussion groups conducted sessions on current problems pertaining to venting of cores and molds, pattern design and its relation to production, cast iron inoculants, and related subjects.

The 80 members and guests at the general meeting then divided into groups for round table discussion. G. W. Simes, American Steel Foundries, Alliance, Ohio, presided at the steel session; the pattern group was led by David T. Born, American Steel Foundries; M. G. Winters, Winters Foundry & Machine Co., Canton, Ohio, served as leader of the non-ferrous round table; and K. F. Schmidt, United Engineering & Foundry Co., Canton, Ohio, kept the discussion moving for the cast iron meeting.

Philadelphia Holds Non-Ferrous Forum

By B. A. Miller

PROCLAIMED a "Forum on Non-Ferrous Metals," the January 12 meeting of the Philadelphia Chapter, held at the Engineers' Club, had as its principal speaker D. Frank O'Connor, American Saw Mill Machinery Co., Hackettstown, N. J. Dr. G. H. Clamer, Ajax Metal Co., Philadelphia, served as the technical chairman.

Mr. O'Connor, who is Vice-Chairman of the National Brass and Bronze Group, gave a general outline of non-ferrous practices, predominately brass and bronze, showing where a few variables resulted in defective castings, such as the poor heating of ladles used in pouring; overheating of metal in the furnaces; improper atmospheres in melting; improper pouring temperatures, etc.

He cited experiences through the past years, although in some instances elementary, which caused leaky castings. Some of the found-

Ladies' Night Dinner is always a big event with the Eastern Canada and Newfoundland Chapter, and this latest annual event, held at the Mount Royal Hotel, Montreal, on December 15, was no exception. Combined with National Officers' Night, the meeting took on added importance by the presence of F. J. Walls, International Nickel Co., National Vice-President; R. T. Rycroft, Jewell Alloy and Malleable Co., Buffalo, National Director, and Joseph Sully, Sully Brass Foundry, Ltd., Toronto, National Director. Guest speaker at the occasion was Gabriel Rousseau, Director, Arts & Crafts School, Montreal. Mr. Rousseau described the technical educational programs set up by the Province for boys of various ages and with different degrees of schooling.

ries in the Philadelphia area cooperated by sending fractures of defective castings and leakers so that Mr. O'Connor could examine the specimens and offer reasons for the defects.

Synthetic Molding Sand Is Subject at Michiana

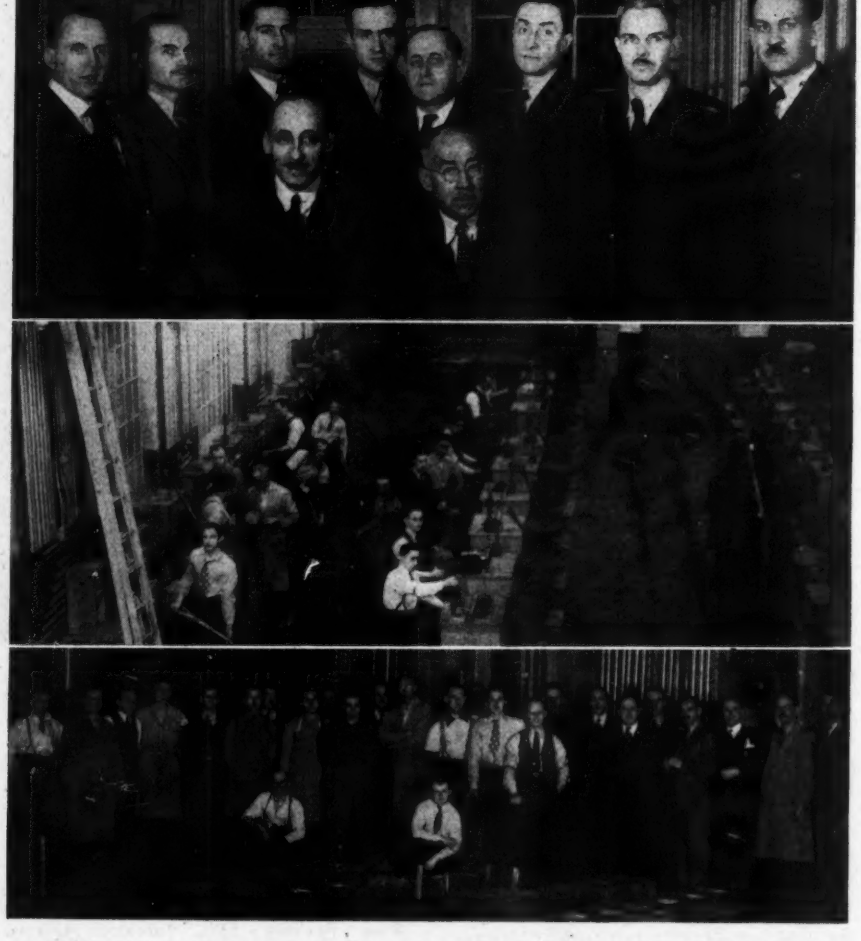
By C. W. Peterson

FOUNDRYMEN of the Michiana Chapter of the American Foundrymen's Association met at the Hotel LaSalle, South Bend, Ind., on February 6 to hear a talk on "Synthetic Molding Sand" and to exchange ideas on this subject. In spite of dangerous driving conditions, over 100 members and guests were present, which is convincing evidence of the importance of this subject.

The guest speaker was E. W. Claar, Eastern Clay Products, Inc., Eifort, Ohio. In his talk, Mr. Claar first listed the silica sands and clays commonly used in synthetic molding sands, and explained the outstanding properties of these materials. He then pointed out how a molding sand can be made to fit almost any foundry requirements by combining silica sands and clays having the required characteristics.

The speaker gave many helpful examples of combinations that would be suitable for producing various types of castings. Examples of sand difficulties and how they had been corrected by changing the type or amount of bonding materials were related by Mr. Claar, from his own experience. He was careful to emphasize certain limitations of synthetic sands, especially in foundries not equipped to mix them properly. Questions and discussions brought out many points of special interest to those present.

V. C. Bruce, Chapter Chairman, Buckeye Products Co., Elkhart, Ind., presided at the meeting.



Members of the Educational Committee of the Eastern Canada & Newfoundland Chapter paid a recent visit to the Montreal Technical School to see how the Chapter sponsored course in molding was progressing. Some of the committee members are shown in the top photo, as follows (left to right): H. E. Francis, D. Allard, H. J. Kozlowski, John McCallum, O. L. Voissard, C. H. Poiret, N. E. Prunier, L. Beaudry, H. Louette and E. Cotteur. Other photos show first-year students in the foundry, and some of the students getting first-hand information from committee members.

Magnesium Castings Topic at Twin City Chapter

By Alexis Caswell

APPROXIMATELY 90 members and guests attended the January 25 meeting of the Twin City Chapter at the Curtis Hotel, Minneapolis, to hear M. E. Brooks, Dowmetal Foundry, The Dow Chemical Co., Bay City, Michigan.

Mr. Brooks' talk on "Production of Magnesium Castings" was augmented by an exhibit of various types of magnesium castings, shown by R. C. Hitchcock & Sons, Minneapolis.

Chairman A. M. Fulton, Northern Malleable Iron Co., St. Paul, presided at this meeting, which attracted a large number of visiting foundrymen and engineers. Axel F. Carlstrom, Smith-Sharpe Co., Minneapolis, as chairman of the Door Prize Committee, conducted a drawing for three prizes.

Round Table Meetings at Northern California

By Richard Vosbrink

APPROXIMATELY 137 members and guests attended the January 12 meeting of the Northern California Chapter, held at the San Francisco Engineers Club, with Chapter President Ralph C. Noah, San Francisco Iron Foundry, San Francisco, presiding.

During the general session G. L. Bostwick and E. H. Schleede, United States Gypsum Co., Chicago, the guest speakers, discussed "How to Make Patterns and Models with Gypsum Cement."

Following this were interesting round table discussions. The Non-Ferrous group, under the direction of D. C. Caudron, Pacific Brass

Foundry of S. F., San Francisco, and G. E. Dalbey, U. S. Navy Yard Foundry, Mare Island, Calif., considered Mr. Dalbey's experiments in "The Absorption of Gases in Melting Brass and Bronze."

A Gray Iron session under the leadership of H. E. Henderson, H. C. Macaulay Foundry Co., Berkeley, Calif., and A. M. Ondreyco, Vulcan Foundry Co., Berkeley, elected to study "Cupola Melting." R. A. Wilson, Pacific Steel Casting Co., Berkeley, and P. C. Rodger, General Metals Corp., Oakland, Calif., led the steel group, which discussed "Rigging for Steel Castings."

During the evening, Nate Weinger, Western Foundry Co., Portland, Oregon, was given recognition for his share of the work in organizing the newest A.F.A. Oregon Chapter.

REGIONAL CONFERENCE

Draws Record Crowd for Wisconsin

AN ENROLLMENT of almost 600 was recorded for the 8th Regional Foundry Conference, sponsored jointly by the Wisconsin Chapter and the University of Wisconsin, which was opened by Chapter Chairman Harry E. Ladwig, Allis Chalmers Mfg. Co., Milwaukee, on February 8 at the Hotel Schroeder, Milwaukee.

F. Ellis Johnson, Dean, College of Engineering, University of Wisconsin, Madison, in the opening address, invited closer co-operation between foundries and the University. Mr. Johnson said that some of their educational plans had to be changed at the outbreak of the war, but that now they again were looking to the future and were doing everything possible to line up men at the top in the various technical phases of the foundry, so that they would be in a position to offer maximum facilities to foundrymen and prospective foundrymen.

The first general meeting was held under the Chairmanship of C. W. Morisette, Milwaukee Vocational School, Milwaukee, and was devoted to the important subject of apprenticeship. Three speakers at this session presented their views of this vital subject: W. F. Patterson, Director, U. S. Apprentice Training Service, War Manpower Commission, Washington, discussed some of the facilities available and the attitude of the Government; Dr. W. F. Rasche, Director, Milwaukee Vocational School, compared the apprenticeship training programs of one of our enemy countries with one of our allied countries and, in general, presented the point of view of the educators; C. W. Wade, Caterpillar Tractor Co., Peoria, Illinois, outlined the method followed in that plant and, in general, gave the point of view of industry.

The luncheon meetings were highlighted by such speakers as Prof. Don Lescohier, University of Wisconsin, on February 8, and Dr. R. L. Lee, General Motors Corp., Detroit, on February 9. Prof. Lescohier in his subject of "Current Wage Problems," traced the record of wages and productivity for the past hundred years and showed that wages, generally speaking, have risen steadily and that productivity per man hour also has been raised proportionately. He predicted that wages could go up still further, but only if the productivity would increase also.

Dr. Lee in his talk on "Humanics in the Foundry" compared humans to metals and paraded by word pictures and gestures the many types of individuals in existence. He said that like metals, human beings were different under changing conditions.

The high attendance point of the conference was reached at the banquet February 8, when approximately 800 gathered to see "From D-Day to Germany," taken in color by Jack H. Lieb, ace news reel photographer for Metro-Goldwyn-Mayer. Mr. Lieb gave a running commentary as the film was being shown.

At the final session, H. P. Kreulen, Grede Foundries, Inc., Milwaukee, introduced John Perkins, Ford Motor Co., Ltd., of Canada, Windsor, Ontario, who presented a paper "Centrifugal Castings." Mr. Kreulen then turned the meeting over to Chapter Chairman Harry E. Ladwig, who, in his capacity as Chairman of the Wisconsin Chapter, gave recognition to the many men who had worked so hard to make the conference a success.

Reports on Chapter Activities

Officers and representatives of A.F.A. chapter and other foundry groups who report on local activities in this issue are identified below:

Canton District—Geo. M. Biggert, United Engineering & Foundry Co., Canton, Ohio; Chapter Secretary.

Central Ohio—Frank Kiper, Ohio Steel Foundry Co., Springfield, Ohio; Chapter Secretary.

Cincinnati—Jos. Schumacher, Hill & Griffith Co., Cincinnati; Chapter Secretary.

Detroit—H. H. Wilder, Vanadium Corp. of America, Detroit; Chapter Reporter.

Eastern Canada and Newfoundland—G. Ewing Tait, Dominion Engineering Works, Lachine, Que.; Chapter Vice-Chairman.

Michiana—C. W. Peterson, Dodge Mfg. Co., Mishawaka, Ind.; Chapter Director.

Northern California—Richard Vosbrink, Berkeley Pattern Works, Berkeley; Chapter Reporter.

Philadelphia—B. A. Miller, Cramp Brass & Iron Founders Div., Baldwin Locomotive Works, Eddystone, Pa.; Chapter Director.

Saginaw Valley—J. J. Clark, Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich.; Chapter Reporter.

St. Louis—C. E. Rothweiler, Hickman, Williams & Co., St. Louis; Chapter Secretary-Treasurer.

Texas—L. G. Stenzel, Stenzel Pattern Works, Houston; Chapter Reporter.

Western New York—J. Ralph Turner, Queen City Sand & Supply Co., Buffalo; Chapter Secretary.

Abstracts

NOTE: The following references to articles dealing with the many phases of the foundry industry, have been prepared by the staff of *American Foundryman*, from current technical and trade publications.

When copies of the complete articles are desired, photostat copies may be obtained from the Engineering Societies Library, 29 W. 39th St., New York, N. Y.

Acid-Resisting Iron

HIGH-SILICON. *"A Further Note on the Microstructure of High-Silicon Acid-Resisting Iron,"* J. E. Hurst and R. V. Riley, THE IRON AND STEEL INSTITUTE, Advance Copy, December, 1944, 3 pp.

Further observations on the nature of the "barley-shell" structure (see *Journal of The Iron and Steel Institute*, 1944, No. I, pp. 221p-224p) are recorded. The well-defined barley structure observed by W. Wrazej (*Journal of The Iron and Steel Institute*, 1944, No. I, pp. 227p-236p) on pure (electrolytic) iron and steel, was found to be produced only when the etchants containing hydrofluoric acid were contaminated with silica or silicon-bearing compounds. The dissolved silica in the etchant could be derived from a number of sources, as, for example, the glass vessel in which the reagent had been stored or from a specimen of high-silicon iron alloy previously etched in the same etchant. The barley-shell structure was invariably produced on high-silicon iron alloys even when the etchant was free from silica.

The fact that silicon or its compounds, either in the etching reagent or in the specimen, are essential to the formation of the barley-shell structure will have to be taken into consideration in any explanation of its exact nature.

Adhesives

RUBBER-PLASTIC. *"Metlbond Adhesive for Metals,"* G. G. Havens and H. R. Jenks, THE IRON AGE, January 18, 1945, vol. 155, no. 3, pp. 62-64, 136.

A high strength adhesive which can be cured at low pressures in inexpensive jigs has been developed by combining a rubber-base adhesive and a plastic-base adhesive. This adhesive was developed for bonding metals and non-metals in the aircraft construction. Several variations of the adhesive have been used to meet the needs of various conditions.

Blast Furnace

DRY BLAST. *"Analysis and Advantages of Operating Furnaces on Dry Blast,"* L. L. Lewis, STEEL, January 15, 1945, vol. 116, no. 3, pp. 96, 98, 122, 124.

The use of dry blast is a means for eliminating one of the variables in blast furnace operation and can be used to secure maximum production and fuel economy. Many of the users of dry blast have failed to secure the maximum benefits of this practice, largely because of failure of their air conditioning units. With the proper equipment in operation, however, dry blast offers the following advantages: it feeds air to the blowers at a constant temperature and humidity; by cleaning the air, it indirectly reduces the cost of blower maintenance; since a constant moisture content is assured, it permits operating the furnace at the limit of other variables; it reduces the fuel-iron ratio; and it produces a more uniform product.

Brass and Bronze

POROSITY. *"Porosity in Copper Alloy Castings,"* K. Strauss, CANADIAN METALS AND METALLURGICAL INDUSTRIES, January, 1945, vol. 8, no. 1, pp. 27-28.

After listing the factors which contribute to porosity in high-copper alloys, the author discusses porosity caused by sulphur and sulphur dioxide, hydrogen, and carbon monoxide and carbon dioxide.

Copper-Base Alloys

POROSITY. *(See Brass and Bronze.)*

Core Practice

MAGNESIUM CASTINGS. *"Magnesium Inhibitors and Their Relationship to Core Practice,"* G. H. Curtis, LIGHT METAL AGE, January, 1945, vol. 3, no. 1, pp. 16-21, 39-40, 46.

Experiences of the author have shown that potassium fluoborate not only is satisfactory as an inhibitor for magnesium cores, but that it has certain advantages over other materials which have been used for this purpose. Potassium fluoborate can be incorporated in the sand mix and need not be sprayed on the outside of cores. For castings with heavy sections, a small amount of sulphur used with the potassium fluoborate will give additional protection. Workability of the sand is not impaired. Cores containing potassium borofluoride can be baked at a higher temperature than most inhibitors will permit, producing a harder surfaced core. Cores collapse faster and shakeout more readily than when made with boric acid. Moisture pick-up is not a problem when storing potassium borofluoride cores.

About the only unsatisfactory characteristic of core sands containing potassium borofluoride is that such sands are difficult to reclaim. A satisfactory reclamation process is still being sought.

Cupola Operation

DRY BLAST. *(See Blast Furnace.)*

Damping Capacity

STEEL. *(See Steel.)*

Design

RULES AND APPLICATIONS. *"Design Proportions Affecting Qualities of Castings,"* J. A. Wettergreen, PRODUCT ENGINEERING, January, 1945, vol. 16, no. 1, pp. 27-31.

The author discusses the principles of casting design which should be observed to produce sound castings and to avoid expensive difficulties in making and finishing the casting.

Die Castings

LOCATING SURFACES. *"How to Select the Locating Surfaces in Designing Die Castings,"* DIE CASTING, January, 1945, vol. 3, no. 1, pp. 18-19.

The proper selection of locating surfaces is of the utmost importance in all types of castings which subsequently are to be machined. This article gives hints on how to select the most satisfactory locating surfaces for die castings.

Ferrous Metals

HIGH-SILICON IRONS. *(See Acid-Resisting Iron.)*

RECENT DEVELOPMENTS. *(See Materials.)*

Gray Cast Iron

ALLOY CAST IRON. *"Automobile Castings,"* J. B. Duncan, IRON AND STEEL, December, 1944, vol. 17, no. 17, pp. 709-713.

The British automobile industry uses a large number of alloy cast iron parts. These parts are supplied by foundries which have developed alloy cast irons which meet their requirements. Chromium, molybdenum, and nickel have proven to be the most important alloying elements in automotive irons. Cylinder blocks and brake drums are cast of a chromium cast iron. Camshafts are made of a molybdenum-nickel-chromium alloy cast iron. Crankshafts are cast of a chromium-molybdenum alloy developed for that use.

Heat Treatment

SUB-ZERO. *"Sub-Zero Treatment of Steel," H. C. Amtsberg,* THE IRON AGE, January 11, 1945, vol. 155, no. 2, pp. 50-53.

Sub-zero cooling, properly combined with tempering, has proven a valuable means for completely transforming au-

stenite to martensite. Stresses resulting from dimensional changes at low temperatures introduce the danger of cracking, so the heat treatment cycle selected should take this into consideration. The author discusses the cooling of hardened steels to sub-zero temperatures and the structural changes which accompany such treatment.

SUB-ZERO. *(See Steel.)*

Impregnation

CASTINGS. *(See Salvage.)*

Inhibitors

MAGNESIUM CASTINGS. *(See Core Practice.)*

Magnesium-Base Alloys

INHIBITORS. *(See Core Practice.)*

PROPERTIES AND USES. *"Engineering and Application of Magnesium Alloy Castings,"* David Basch, ALUMINUM AND MAGNESIUM, December, 1944, vol. 1, no. 3, pp. 15-19; January, 1945, vol. 1, no. 4, pp. 22-23, 26-30.

The first part of this article gives a very complete description of the properties and characteristics of magnesium-base alloys in various conditions. The second part of the article continues this description and makes recommendations concerning the design of magnesium-base alloy castings. Included in the article are some comparisons of costs of magnesium-base and other types of alloys for similar applications.

Malleable Cast Iron

MALLEABILIZATION. *"Short Cycle Malleabilization of White Cast Iron,"* E. E. Howe, THE IRON AGE, January 18, 1945 vol. 155, no. 3, pp. 66-68.

A short malleabilization cycle which yields a product with satisfactory ductility can be achieved by first decomposing the massive cementite to a pearlite, and converting the pearlite matrix to a spheroidized cementite. The resulting material is a spheroidized pearlitic malleable cast iron.

Materials

FERROUS METALS. *"Some Recent Developments in Engineering Materials,"* Part I, *Ferrous Metals,* Archibald Black, MECHANICAL ENGINEERING, February, 1945, vol. 67, no. 2, pp. 101-108.

Since the beginning of the war, shortages or experience in the use of materials has brought about the development of new or substitute materials and processes. In this section, which is the first of four installments on materials, the author has digested the important developments in ferrous materials during the past ten years. Materials or processes which he discusses include NE steels, low-cost alloy steels, isothermal transformation of steel, interrupted quenches, cold treatment of steel, steel hardenability calculated from composition, high-strength cast irons and cast steels, leaded steels, graphitic steels, boron steel, zirconium-bearing and columbium-bearing iron and steel, nitrogen as an alloying element in steels, nitride casehardening of stainless steels, silicon impregnation of steel, new magnetic alloys, nickel-iron-titanium alloys, and flame treating.

Mechanical Properties

COHESIVE STRENGTH. *"Symposium on Cohesive Strength,"* A.I.M.E. Technical Paper No. 1782, METALS TECHNOLOGY, December, 1944, vol. 11, no. 8, p. 79.

Five papers were presented at the Symposium on Cohesive Strength, held at the Chicago meeting, October, 1943: "The Technical Cohesive Strength of Metals in Terms of the Principal Stresses," by D. J. McAdam, Jr.; "Fracture and Flow in Metals," by P. W. Bridgman; "Conditions of Fracture in Steel," by J. H. Hollomon and Clarence Zener; and "Some Speculations Regarding the Plastic Flow and Rupture of Metals under Complex Stresses," by L. R. Jackson.

The entire Symposium was summarized by M. Gensamer. His summary opens this volume. Discussions are printed following the paper to which they pertain.

STEEL. *(See Steel.)*

Metallography

CAST METALS. *"The Orientation Texture at the Surface of Cast Metals,"* Gerald Edmunds, A.I.M.E. Technical Publication No. 1773, METALS TECHNOLOGY, January, 1945, vol. 12, no. 1, p. 1.

Studies of surface orientation of cast zinc which solidified against molten lead disclosed a surface orientation texture parallel to the surface of the casting. Surfaces of aluminum and alpha-beta brass die castings showed random grain orientation.

Pipe

SERVICE CONDITIONS. *"Factors Affecting the Service Life of Underground Pipe Structures,"* H. W. Jewell, BRICK & CLAY RECORD, January, 1945, vol. 106, no. 1, pp. 39-42.

The author describes conditions which affect the service life of underground pipe structures of all materials. Conditions which he discusses include disintegration, decomposition, corrosion, flow line attack, chemical attack, alternate wet and dry, erosion, termites, bacteria, rodents, thermal reduction, roots and abrasion

Porosity

BRASS AND BRONZE. *(See Brass and Bronze.)*

Precision Casting

APPLICATIONS. *"Casting Supercharger Buckets at Allis Chalmers," G. W. Birdsall,* STEEL, January 29, 1945, vol. 116, no. 5, pp. 72-75, 96, 99-100.

The author describes in detail the application of the lost wax method of casting to produce supercharger buckets for aircraft engines. The buckets are cast

A New A.F.A. Publication . . .

Recommended Practices for NON-FERROUS ALLOYS

Information contained in this important New A.F.A. publication has been compiled by the Recommended Practices Committee of the A.F.A. Brass and Bronze Division, and the Committee on Sand Casting of the A.F.A. Aluminum and Magnesium Division. A book that provides non-ferrous foundrymen with accurate, up-to-date data for the production of practically any non-ferrous alloy casting, and enables them to check present production practices against accepted standards and wide experience. An indispensable reference work whereever non-ferrous metals are cast . . . compiled by many leading foundrymen and metallurgists. Contains 159 pages, 42 tables, 35 illustrations; cloth bound.

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of a cobalt-chromium-molybdenum alloy to tolerances of 0.001 inch or less.

Also of considerable interest is the author's description of the facilities whereby large numbers of buckets are x-rayed and the films processed.

Radiography

DOUBLE EXPOSURE. *"Improved Sensitivity in Double Exposure Radiography,"* James Rigbey, CANADIAN METALS AND METALLURGICAL INDUSTRIES, January, 1945, vol. 8, no. 1, pp. 20-23.

A method for determining the third dimension of radiographic defects which utilizes two films, rather than a shift of a single film.

EXPOSURE CONTROL. *"Uniform X-ray Exposures,"* H. D. Moreland, STEEL, January 8, 1945, vol. 116, no. 2, pp. 98, 100, 132.

A photoelectric timer has been developed to successfully control photofluorographic exposures. The recording of fluoroscopic images on miniature films has been used by the medical profession. In the future, it may prove of value in industrial radiography.

Risering

STEEL CASTINGS. *(See Steel.)*

Salvage

POROUS CASTINGS. *"Sealants for Metal Castings for Varying Degrees of Porosity,"* R. W. Crawford and Sanford E. Glick, PRODUCT ENGINEERING, January, 1945, vol. 16, no. 1, pp. 53-55.

Impregnation of castings is one of the methods resorted to to salvage porous castings. The process is usually carried out by impregnating the casting with a sealant, either by means of direct pressure or vacuum-pressure methods, and then so treating the casting that the sealant will set or cure. The author discusses methods of impregnation, various impregnating materials, and in particular, resin-styrene copolymers.

Sand

MAGNESIUM. *"Selecting Inhibitors for Magnesium Molding Sand,"* L. W. Eastwood, THE FOUNDRY, December, 1944, vol. 72, no. 12, pp. 82-83, 232, 234. January, 1945, vol. 73, no. 1, pp. 80-81, 208, 210, 212.

The principal function of an inhibitor is to prevent the reaction of magnesium with water. To a lesser extent they are used to prevent the reaction of magnesium with oxygen or nitrogen. The reaction of magnesium with silica, commonly thought of as the principal reason for using inhibitors, rarely occurs when very hot metal passes over a certain portion of the mold and heats the sand to a high temperature.

It is believed that inhibitors function by forming a protective skin on the melt, by forming an inert or less reactive atmosphere, or by coating the sand particles with nonreactive substances. The effectiveness of an oxide film in preventing undesirable reactions is believed to be a function of the relative density of the oxide and the reacting metal.

Among the materials used as inhibitors are fluorides, boric acid, sulphur, and diethylene glycol. The latter might be thought of as a supplementary inhibitor, since it is frequently used in combination with other inhibitors and serves to reduce the amount of water needed in the sand.

The first part of the article discusses the various types of reactions which occur when molten magnesium enters a sand mold and methods of correcting them. The second part of the article discusses various types of inhibitors and the advantages and disadvantages of each.

Steel

ELECTRIC-FURNACE. *"Electric Furnace Steelmaking,"* Earle C. Smith, THE OHIO STATE UNIVERSITY ENGINEERING EXPERIMENT STATION NEWS, December, 1944, vol. 16, no. 5, pp. 3-10.

A critical evalution of electric-furnace methods of producing steel and their place in the economic balance of steel production.

FURNACE REACTIONS. *"Reactions Between Hot Steel and Furnace Atmospheres,"* Floyd E. Harris, METAL PROGRESS, January, 1945, vol. 47, no. 1, pp. 84-89.

A tabulation of gas reactions with metallurgical products and an explanation of their significance and adaptability to specific processes.

HEAT TREATMENT. *"The Influence of the Heat Treatment of Steel on the Damping Capacity at Low Stresses,"* Leopold Frommer and A. Murray, THE IRON AND STEEL INSTITUTE, Advance Copy, December, 1944, 9 pp.

An electromagnetic method of inducing torsional oscillations in freely-suspended cylindrical steel bars was used for measurements of the damping capacity up to a maximum stress of 100 psi. There were six specimens, each 3 in. in dia. and 3 ft. long, all from the same melt, with a composition normal to a 0.6% carbon steel. Measurements were made in the normalized, 830 degrees C. oil-quenched and the fully-tempered conditions; by successive heat treatment these conditions were repeated.

The measurements showed that the damping value was a characteristic property which varied for each condition and was reproduced through two heat-treatment cycles. Within the experimental accuracy the torsional damping capacity is independent of oscillation frequency up to 7,000 cycles per sec. and of stresses up to 100 psi. The damping values as expressed by the logarithmic decrement are 0.5×10^{-4} for the tempered condition, and 0.7×10^{-4} for the oil-quenched condition. The Brinell hardness values showed changes similar to these, and it is suggested that this correspondence is due to the state of aggregation of the carbide, resulting from the heat treatment given.

MACHINABILITY. *"Machinability of Plain-Carbon, Alloy, and Austenitic (Nonmagnetic) Steels, and Its Relation to Yield-Stress Ratios When Tensile Strengths Are Similar,"* J. Janitzky, TRANSACTIONS OF THE A.S.M.E., November, 1944, vol. 66, no. 8, pp. 649-652.

This paper deals with the coordination of the yield-stress ratios of plain-carbon, alloy, and austenitic steels of the same tensile strength with their machinability.

RECENT DEVELOPMENTS. *(See Materials.)*

MECHANICAL PROPERTIES. *"Influence of Rate of Strain and Temperature on Yield Stresses of Mild Steel,"* M. J. Manjoine, JOURNAL OF APPLIED MECHANICS, December, 1944, vol. 11, no. 4, pp. A-211-A-218.

The author has described the influence of rate of strain and temperature on the yield stresses of mild steel. Data was taken from tests performed at 200, 400, and 600 degrees C., and at strain rates varying from 10^{-6} to 10^{3} per sec.

MECHANICAL PROPERTIES. *"Low-Alloy Cast Steels,"* H. A. Schwartz and W. K. Bock, IRON AND STEEL, December, 1944, vol. 17, no. 17, pp. 715-720.

The authors show that for normalized steels and quenched steels which have been tempered above 400 degrees C., the relationship between tensile strength and elongation may be represented by a straight line, calculable from the chemical composition of the steel.

RISERING. *"The Side Feeding of Steel Castings,"* B. Gray, FOUNDRY TRADE JOURNAL, November 9, 1944, vol. 74, no. 1473, pp. 201-204.

After describing the side risers which have been much used in England, the author discusses the freezing of steel castings. He shows that temperature gradients are not the only factors which determine the manner in which a steel casting will freeze. Convection currents and segregation of metal having various melting points also determine the manner in which the casting will freeze. The author concludes the article by summarizing various recommendations and observations about the proper way to feed castings.

SUB-ZERO COOLING. *(See Heat Treatment.)*

SUB-ZERO TREATMENT. *"Effect of Grain Size and Sub-Zero Treatment on Productiwity of Four High-Speed Steels,"* S. M. Depoy, TRANSACTIONS OF THE A.S.M.E., November, 1944, vol. 66, no. 8, pp. 645-648.

In investigating the effects of grain size and sub-zero treatments on the productivity of tool steels, the following conclusions were reached: high austenizing temperatures produce the best structure for metal removing tools; refrigeration treatment of high-speed steel at -100 degrees F. or lower between tempers will produce a superior tool; low austenizing temperatures leave too many undissolved carbides and so produce an inferior tool; for cutting operations where intense heat will be generated at the cutting edge, cobalt-bearing high-speed steel will generally prove superior.

Tool Steels

SUB-ZERO TREATMENT. *(See Steel.)*

Schedule of March Chapter Meetings

March 1

Saginaw Valley Section, Detroit
Fischer's Hotel, Frankenmuth, Mich.
J. A. GITZEN
Delta Oil Products Co.
"Properties of Core Binders and Washes"

✦ ✦

March 2

Western New York
Hotel Touraine, Buffalo
ROBT. L. DOELMAN
Harry W. Dietert Co.
"Sand Affects Casting Finish"

✦ ✦

March 5

Central Indiana
Athenaeum, Indianapolis
CARL JAPFFE
Rustless Iron & Steel Corp.
"Porosity in Steel and Cast Iron"
MANLEY E. BROOKS
Dow Chemical Co.
"Magnesium Casting Methods"

✦

Chicago
Chicago Bar Ass'n. Restaurant
ROUND TABLE MEETING
Steel (Joint Meeting with Pattern Div.)—*"Patterns"*
Gray Iron — *"Practical Foundry Problems"*
Non-Ferrous — *"Magnesium Foundry Control"*
Malleable—*"Boron and Its Effect"*

✦

Metropolitan
Essex House, Newark, N. J.
H. W. DIETERT
Harry W. Dietert Co.
"Mold Atmosphere Control"

✦ ✦

March 6

Michiana
Hotel La Salle, South Bend, Ind.
NATIONAL OFFICERS NIGHT
"Gating and Risering"

✦ ✦

March 8

Northeastern Ohio
Cleveland Club, Cleveland
C. E. WESTOVER
Grede Foundries, Inc.
"Wage Incentives in the Foundry"

✦

Rochester
Seneca Hotel, Rochester
THOS. E. BARLOW
Battelle Memorial Institute
"Ladle Inoculation"

✦

St. Louis
DeSoto Hotel, St. Louis
C. F. ROHLCOETTER
American Steel Foundries
"Casting Inspection"

✦

Texas
Fort Worth, Texas

March 9

Central New York
Hotel Onondaga, Syracuse
THOS. E. BARLOW
Battelle Memorial Institute
"Gray Iron Structure"

✦

Northern California
Claremont Hotel, San Francisco
SAND COMMITTEE
"Sand and Mold Materials"

✦

Philadelphia
Engineers' Club, Philadelphia
F. G. SEFING
International Nickel Co.
"Study of Molding Methods for Sound Castings"

✦

Wisconsin
Schroeder Hotel, Milwaukee

✦ ✦

March 12

Cincinnati
Engineering Society Headquarters, Cincinnati
"X-raying as Applied to the Foundry Industry"

✦

Western Michigan
Ferry Hotel, Grand Haven, Mich.
ARTHUR TUSCANY
Foundry Equipment Mfrs. Assn.
"Let's Look at the Foundry Industry"

✦

Northern Illinois-Southern Wisconsin
Hotel Hilton, Beloit, Wis.
A. S. KLOPF
Firegan Sales Co.
W. A. HAMBLEY
Allis-Chalmers Mfg. Co.
"Discussion on Defects—Their Causes and Cures"

✦ ✦

March 15

Detroit
Rackham Educational Memorial
L. A. DANSE
General Motors Corp.
"Inspection and Non-Destructive Testing"

✦ ✦

March 16

Eastern Canada and Newfoundland
Mount Royal Hotel, Montreal
G. M. YOUNG
Aluminum Co. of Canada Ltd.
"Prospects and Problems for Light Alloy Castings"

✦

Quad City
Ft. Armstrong Hotel, Rock Island, Ill.
W. W. LEVI
Lynchburg Foundry Co.
"Cupola Operation and Control"

March 22

Canton District
Elks Club, Canton, Ohio
"Non-Destructive Testing"

✦ ✦

March 26

Chesapeake
Engineers Club, Baltimore
J. T. MACKENZIE
American Cast Iron Pipe Co.
"Gray Iron Castings"

✦ ✦

March 27

Toledo
Toledo Yacht Club

✦ ✦

March 28

Twin City
Curtis Hotel, Minneapolis
W. B. GEORGE
R. Lavin & Sons, Inc.
"Brass and Bronze Castings"

✦ ✦

APRIL MEETINGS

April 2

Central Indiana
Athenaeum, Indianapolis
DR. A. ALLEN BATES
Westinghouse Electric & Mfg. Co.
"Plastics vs. Metals"

✦

Chicago
Chicago Bar Ass'n Restaurant
GENERAL MEETING

✦

Metropolitan
Essex House, Newark, N. J.
T. H. HOULT
Kent Alloys Ltd.
A. CRISTELLO
Bendix Aviation Corp.
"Gating, Risering, Chilling Magnesium Sand Castings"

✦ ✦

April 3

Michiana
Hotel LaSalle, South Bend, Ind.
J. M. KANE
American Air Filter Co.
"Control of Dust"

✦ ✦

April 5

Saginaw Valley Section, Detroit
Fischer's Hotel, Frankenmuth, Mich.
A. CRISTELLO
Bendix Aviation Corp.
"Aluminum and Magnesium Foundry Practice"

✦ ✦

April 6

Ontario
Royal Connaught Hotel, Hamilton, Ontario
ROUND TABLE MEETING
Gray Iron, Steel, Malleable, Non-Ferrous

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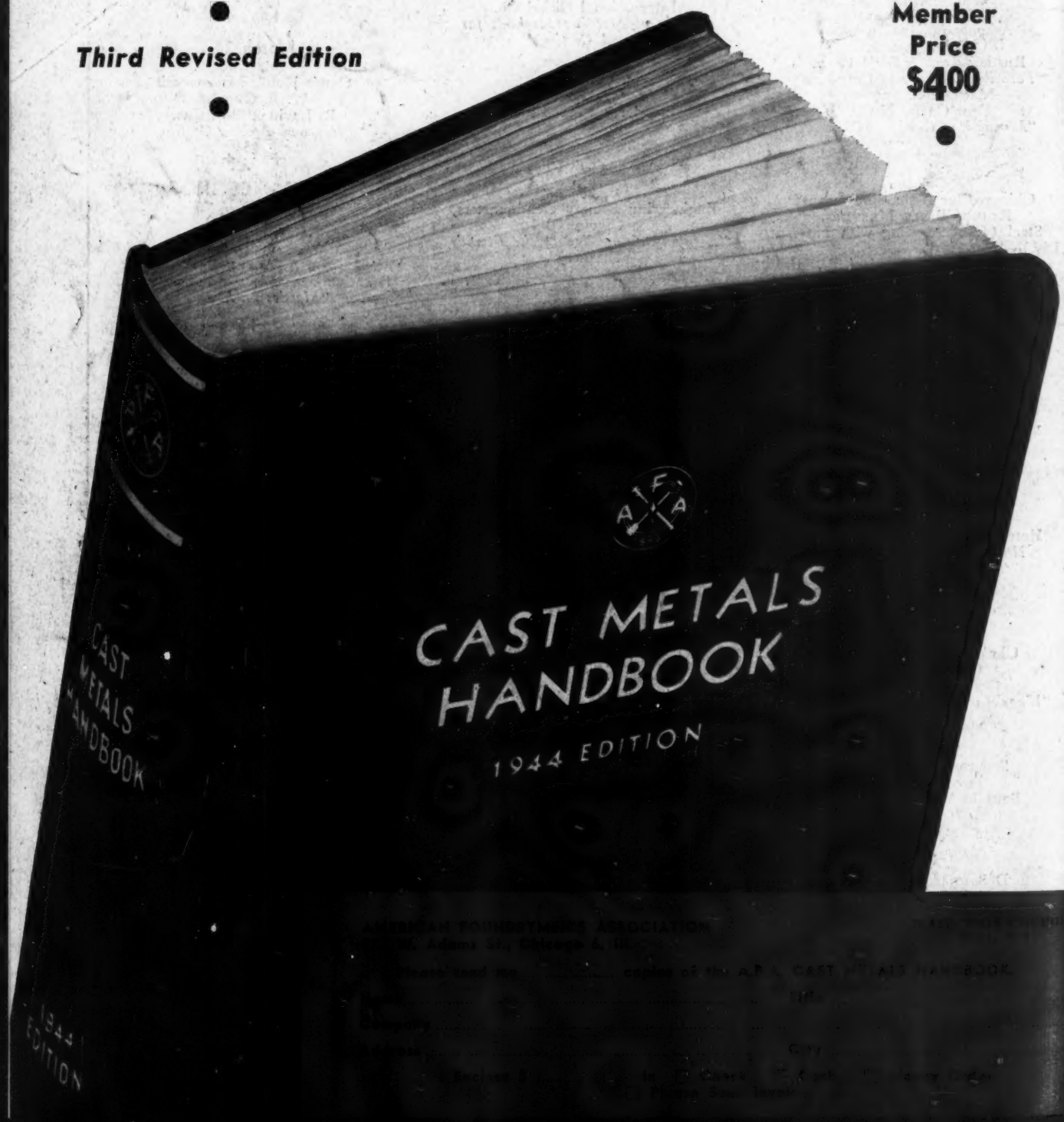
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